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INSIDE

EVERYTHING
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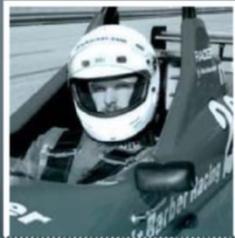
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THE GRID

SCOTT PARKER EDITOR

STICKER SHOCK?

Does the 2016 Corvette Z06 C7.R Edition pay homage or simply join a list of flaccid appearance packages? This is a question that one of my fellow journalists raised shortly after Chevrolet announced the C7.R Edition, as well as several design packages. While I don't share his sentiment that a fitting representation of the C7.R would have been a stripped-down racer akin to the 2014-'15 Camaro Z/28, I do believe that some performance enhancements were in order for such a limited production run.

For your average Z06 owner, 650 horsepower and 650 lb-ft of torque is plenty. And if it is going to honor the C7.R, which has a naturally aspirated 5.5-liter, power shouldn't be a focal point. Instead, some attention needs to be paid to greater harnessing the LT4's capabilities with better traction. The 285/30ZR19 and 335/25ZR20 Michelin Pilot Sport Cup 2 tires are both substantial and sticky, but certainly not comparable to the C7.R's race tires. If Chevrolet had worked with Michelin to develop Pilot Sport Cup+ tires for the C7.R Edition, it would have benefitted from a substantial upgrade in grip while staying faithful to the original. Perhaps even a few small upgrades to the sway bars and suspension calibration would have sealed it as more than just a graphics and interior package.

An even wilder option would have been a widebody kit. [As I type this, a Corvette engineer that spent thousands of hours in the wind tunnel is banging his or her head against a wall.] Given that the C7 Z06 is already 3 inches wider than the Stingray, you might be thinking that it already has a widebody kit. However, in some respects it lacks the drama that the C6 Z06, ZR1, and Grand Sport brought over the base Corvette. Making the C7.R Edition a full 80 inches wide like the race car would certainly change that. While you are at it, why not use a set of center-hub 18x12.5 front and 18x13 rear wheels to fit even larger and stickier tires with the suspension adjustments to match?

Bear in mind that I write all of this without hostility because I honestly can't blame Chevrolet. While track rats and penniless journo may gripe, I think they gave the average Corvette owner exactly what they wanted with the C7.R Edition and the design packages released for 2016. Moreover, they have been doing this for years and told us to expect more of it. I guess we'll all have to save our shock and awe for the C8, ZR1, Zora, or whatever they are calling this mid-engine monstrosity that is destined to cause some serious waves. Look out Ford GT; the Corvette is coming for you. **VETTE**





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FROM THE ARCHIVES

DREW HARDIN WORDS
TEN ARCHIVES PHOTOS



When the one-millionth Corvette was built, just two men had served as Chief Engineers during the car's 39 years of production: Zora Arkus-Duntov and Dave McLellan. Both were on hand for the milestone celebration at Bowling Green in July 1992.

ONE IN A MILLION

Because so many of our archive stories are about Corvettes from the 1950s and 1960s, 1992 seems like it was just yesterday. But it's been nearly a quarter-century since the one-millionth Corvette rolled off the Bowling Green assembly line back in July 1992. And it's been about a year and a half since that very same car fell down the infamous sinkhole that opened up under the National Corvette Museum.

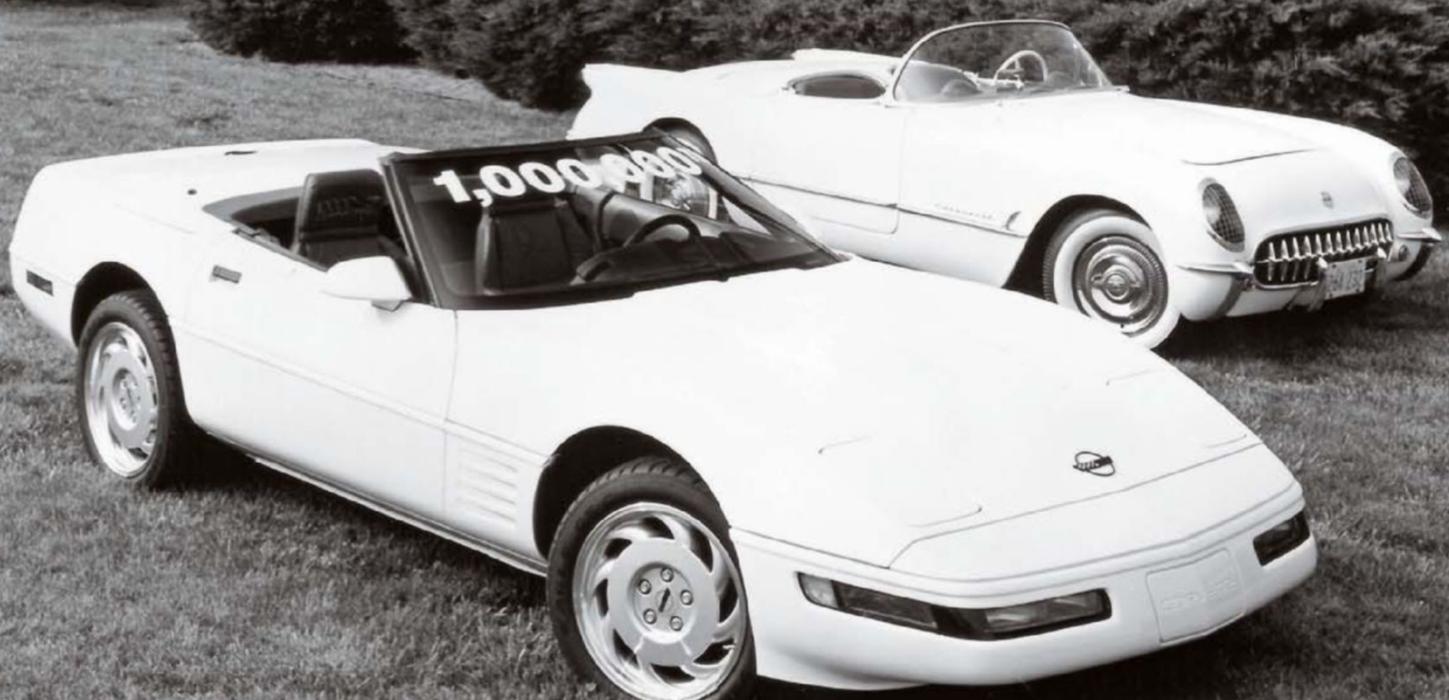
The white convertible with red interior—spec'd specifically to duplicate the color scheme of the very first Corvettes—is equipped with a 350ci LT1 small-block V-8, a new-for-1992 engine named after the high-compression, solid-lifter LT-1 found in Vettes of the early 1970s. In 1992 it replaced the L98 V-8 and, with a 300hp rating, produced 50 more hp than the outgoing engine.

The 1992 Corvettes also received a new Bosch-developed traction control system called Acceleration Slip Regulation (ASR) and new

asymmetric Goodyear Eagle GS-C tires, replacing the Gatorbacks. The combo of the new tires and traction control led Chevrolet to dub the 1992 model a "car for all seasons."

The milestone car was donated to the Corvette museum, where it led a peaceful life until the ground underneath it gave way in February 2014. Eight cars tumbled down the hole, including this one, a 40th Anniversary model, the 1.5-millionth Corvette (from 2009), and the "Blue Devil" 2009 ZR1. The millionth Vette suffered relatively little damage compared to some of the others, though a December 2014 story in the *Detroit News* described the car as "covered in dirt and bits of gravel. Cement or dirt is visible inside a broken taillight, on the rear of the car, on the hood and the interior floor. There are scratches and paint is chipped in places, the rear suspension is heavily damaged, the front fender is mangled and the windshield is completely smashed."

Of the eight cars that fell, the millionth Vette is one of just three that Chevrolet opted to restore. The Blue Devil was refurbished first; work continues on this car and a black 1962 Vette that sustained minimal damage after landing tail-first in the hole. **VETTE**



PRODUCT PREVIEW



SAFETY DANCE

 You can thank the off-road world, specifically the Lucas Oil Off-Road Racing Series and Traxxas TORC off-road series, for Holley Performance Product's latest innovation in safety. The Vent Tube Spill Reduction Valve reduces fuel spillage from carburetor vent tubes during a crash as well as fuel slosh during hard launches or stops. The internal valve ball allows fuel vapors to vent normally

through the vent tubes when it is upright, and helps close up the tube when upside down. For a demonstration,

check out Holley's YouTube page. Two versions are available with (PN 26-343) and without (PN 26-342) a barbed end. For more info visit holley.com or call **866/464-6553**.



MAD MAX

 Water spots can be the bane of any Corvette owner's existence, particularly if you have hard water and a dark paint color, like black. Your glass-like finish can look darn near funky with water spots. The folks at California Car Cover have come up with a solution: the Master Blaster. This handy tool uses 8 peak horsepower with twin-fan, 4hp motors to

pump out 58,500 feet per minute of warm air and blow those water spots right off. Five different nozzles allow you to direct the clean, filtered air where you want it to go. This product is made in the USA and comes with a 10-foot power cord. For more info visit calcarcover.com or call **800/423-5525**.



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TORQUE SPEC



This brand-new bolt-together torque converter from TCI Automotive features increased stall speeds and lockup clutch torque capacity while also allowing for easy stall changes. It is designed specifically for GM 4L80E and TCI 6x Six-Speed transmission applications. Its high-stall nature gets the engine to max torque and multiplies it as the vehicle starts to move. This improves vehicle launch and overall performance. Additionally, the converter features a triple-disc lockup assembly with woven carbon frictions to handle more torque and dissipate heat more efficiently than the stock component. TCI asserts that it's designed with a higher clamping force on the clutch friction than stock and competitor options. The converter also boasts full wide-open-throttle lockup capability.

The converter features a CNC-machined, billet bolt-together design. No welding or cutting is required to access the converter's internals, meaning that the unit can be unbolted and disassembled. This enables easy stall changes and rebuilds, as well as efficient replacement of bearings and lockup components. The converter uses premium roller bearings instead of bushings for lower parasitic losses and better durability, while also featuring a hand-TIG-brazed turbine and fully furnace-brazed impeller for maximum strength. It is hand-assembled to precise tolerances and HDT (Heat Dissipating Technology) coated. The TCI GM 4L80E and 6x Six-Speed High-Stall, Lock-Up Torque Converter does not require tuning. It is available in 2,400-2,600-stall, with custom stall speeds available upon request. For more information, click on over to tciauto.com or call them at **888/776.9824**.



TIGHT SCRAPE

Improved Racing has released a crank-shaft scraper for 4.000-inch stroke GM LS-series engines. These scrapers have been dyno-

proven for up to 2 percent additional horsepower. In one of Improved Racing's tests, a gain of 8.7 hp at the wheels was achieved from a baseline of 482.7 hp on a C6 with a stroked LS3. Crankshaft scrapers also provide the additional benefit of reducing oil starvation by returning more oil to the sump and minimizing oil aeration.

The scraper (PN EGM-305, \$70) was designed using a 4.000-inch stroke Manley crankshaft and will fit most factory and aftermarket crankshafts of the same stroke. It's designed to work with ARP main cap studs and will fit most factory and aftermarket connecting rods. To check out this part and their other innovative products visit improvedracing.com or call **407/705.3054**.

FULL THROTTLE



FAST designed a new drive-by-wire throttle body for LS engines to outperform all other aftermarket units, and look good in the process. All the benefits of the current 102mm Big Mouth Throttle Body are now available for drive-by-wire applications thanks to the new FAST 102mm Electronic Throttle Body for GM LS engines. It provides a huge increase in airflow over stock—especially when applications are running a FAST manifold. However, it maintains stock characteristics at idle.

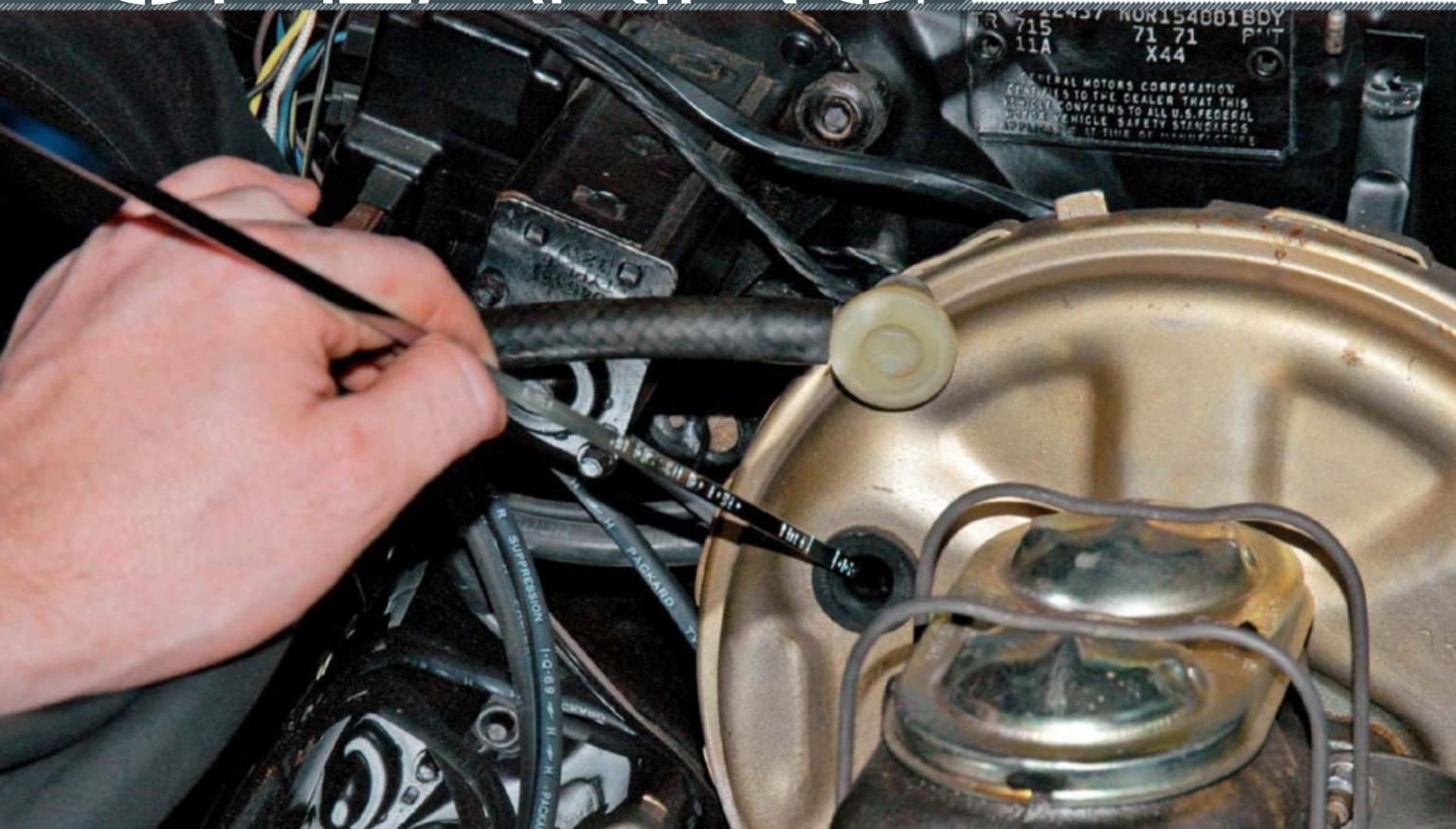
The electronic throttle body is designed to be plug-and-play with the stock L99, LS3, or LS7 ECU, as well as with any LS engine utilizing a FAST EFI system in conjunction with the new FAST ETC module. The throttle body also features stylish black wrinkle powdercoating for excellent aesthetics and a unique look. It utilizes a dual return spring for increased reliability, while a high-performance, hand-built electric motor provides higher torque and a quicker response than the stock motor. Meanwhile, a precision, non-contact TPS sensor cannot wear out over time.

Designed entirely in-house by the COMP Performance Group engineering team, the FAST 102mm Electronic Throttle Body for GM LS engines does not use any stock GM components. Each component has been upgraded for increased performance and reliability. For more details visit fuelairspark.com or call **877/334.8355**.



TECHNICALLY SPEAKING

JAMES BERRY CORVETTE TECH GURU



VANISHING BRAKE FLUID DETERMINING WHERE THE BRAKE FLUID IS GOING WHEN THERE IS NO INDICATIONS OF A LEAK

QI have been following your column for the last few years and have picked up several tips. I have a question on my 1976 Anniversary Edition Corvette. I live in the Chicago area so I only get to enjoy driving my car in the summer months. After storage, the brake fluid is very low, and during the summer months my Corvette will need the brake fluid topped off periodically. I have inspected and been over every inch of the brake system, including all of the brake lines, calipers, proportioning valve, and the master cylinder. I have also looked inside of the car and checked for any brake fluid on the carpet. Please, can you help me with where the brake fluid may be going?

Also, this may be unrelated but the car smokes when it is first started, especially after sitting for any long periods. I thought this may be valveguide seals. A local mechanic also agreed with me, so I had the valveguide seals replaced but the car still smokes when it is first started, especially after sitting. If you have any ideas on this please let me know.

Thanks,
Marco

AAfter speaking with Marco on the phone, we were able to determine the fault of both of his problems in less than five minutes.

Since Marco had eliminated any visual leak, along with the engine smoke symptom when

the vehicle is first started after sitting I had Marco go out to the garage, remove his engine dipstick and clean off the engine oil with a shop rag. Then I had him remove the large 90-degree plastic check valve from the vacuum booster. I then had Marco insert the engine dipstick into the bottom of the vacuum booster through the hole where the 90-degree plastic check valve was removed.

To verify the master cylinder is leaking, you can remove the two nuts holding it to the vacuum booster and pull the master cylinder forward enough to inspect for any visual leaks. For the visual inspection of the master cylinder, the brake lines do not need to be removed if there is enough play in the lines to let you pull the master cylinder forward enough to check for a leak without damaging the brake lines. The reason I like to leave the brake

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CHECKING FOR BRAKE FLUID
If brake fluid is found on the engine dipstick, then the master cylinder is most likely leaking brake fluid into the vacuum booster, and in Marco's case it was. This is the test I use when trying to determine if the brake master cylinder is leaking from the rear with no visual signs.

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lines attached to the master cylinder during inspection is so that any additional brake fluid spillage from removing the brake lines will not cause a misdiagnosis.

If brake fluid is leaking into the vacuum booster, the brake fluid can cause the rubber diaphragm to fail in the brake vacuum booster. So it's possible when fluid is leaking into the brake booster that the brake vacuum booster may need to be replaced.

BLEEDING THE BRAKE MASTER CYLINDER

If you are going to replace the master cylinder it is important to bleed it first. You must bleed the master cylinder first because any air trapped in the master cylinder would be forced into the brake lines and then into the brake calipers or wheel cylinders.



BLEEDING THE MASTER CYLINDER
It is best to bleed the master cylinder while it is off of the car. You will need fittings and tubes to route the fluid from the exit ports back into the master cylinder reservoir.

If the master cylinder bleeding tools do not come with the master cylinder, you can purchase small sections of steel brake line from your parts house. Attach one end of the line to the master cylinder exit port. Attach vacuum hose to the opposite end of the line and route it back into the reservoir on top of the master cylinder.

Secure the master cylinder in a vice and depress the plunger using a screwdriver slow and steady until you generate air bubbles. Once you purge all of the air out you can install the master cylinder onto the car. Take care not to get any brake fluid onto the car's finish as this could discolor the paint.

BLEEDING THE BRAKE SYSTEM

Now it's time to bleed the rest of the brake system. To start this process I like to

have four old water bottles with the tops cut off. Also, I like to form a hanger assembly for these bottles out of a small piece of wire. Pour about 2 inches of brake fluid in each bottle. You will also need a piece of rubber hose to run from the brake bleeder screw into the bottom of your cutoff water bottles. This can be done with one water bottle; you will just need to move the bottle from wheel to wheel.

When bleeding the brakes, start with the wheel nearest the master cylinder, then the next nearest the master cylinder and so on until all four corners have been bled and there is no evidence of air or discolored fluid in the system. This is the most preferred method.

SOME SERVICE MANUAL CONFUSION

The 1970 service manual states: "The rear calipers contain two bleeder valves (one inboard and one outboard), which necessitate the removal of the rear wheels for bleeding." It does not address the inner or outer caliper half bleeding order.

This is where the confusion comes from. If you pick up a service manual for a 1966 Corvette, it states to start the bleeding process at the Right Rear then the Left Rear, Right Front, and finish with the Left Front, which is totally opposite of the 1970 service manual. Some service manuals, such as the 1993, do not tell you which caliper to start with at all. In reality, there is no difference which caliper you start with no matter what year Corvette you have. I prefer the method



TWO-PIECE CALIPERS

Some Corvette calipers are composed of two halves. So when bleeding an individual caliper it is important to bleed the caliper half closest to the incoming brake hose (the inner half of the brake caliper) connection first. If you bleed the outer half of the brake caliper first it is possible for you to re-introduce air back to the outer caliper-half when you bleed the inner caliper half.

that starts with the wheel nearest the master cylinder like described above.

GRAVITY BLEEDING METHOD

Remove the master cylinder lid, attach the rubber hose to the bleeder screws, open the bleachers one at a time in the order described above, and allow the brake fluid to flow by means of gravity until the brake fluid runs clear and bubble free. This is a slow process so don't be in a hurry. Just open the bleeder

and walk away, checking the master cylinder periodically to make sure it never runs dry.

After approximately five minutes, if no fluid has started to flow out of the bleeder screw by itself, you may need to slowly pump the brake pedal with the bleeder screw open. Install the master cylinder lid, slowly push the brake pedal about halfway to the floor then slowly let the brake pedal come back to the top. Do this three or four times – that should get the brake fluid flowing. Gravity bleeding is basically the exact same thing as pressure

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bleeding except the pressure is much lower. The pressure is only regulated by the gravitational weight of the fluid.

BRAKE PEDAL BLEEDING METHOD

This process requires two people. One person's job is to open and close the brake bleeder screw and the other person's job is to press the brake pedal. First, open the brake bleeder screw and slowly depress the brake pedal. Close the bleeder before the helper's foot reaches the floor. Release the brake pedal

and allow it to return to the top. Repeat this process until the brake fluid runs clear and bubble free into your cutoff water bottle.

VACUUM PUMP BRAKE BLEEDING

One problem with the vacuum pump method is that it can suck air past the bleeder threads and more importantly past the internal piston O-ring seals instead of sucking fluid from the caliper.

These are the preferred methods of bleeding the brakes. There are a few other methods

to bleed the brake system, including pressure pumps, which have some flaws. The pressure method is by far the fastest but does not seal properly on the early model Corvettes. It also does not always allow time for trapped air bubbles to escape like the slower gravity and pedal bleeding methods do.

It's important when bleeding the brakes to continue the process until brake fluid runs clear. This is to remove all of the old brake fluid that may be in the system. Most stock brake fluids absorb water and must be changed regularly or your system will decay from the inside out, including the master cylinder, steel lines, proportioning valve, rubber hoses, and calipers.

There is one other component to keep in mind when bleeding your brake system and that is the proportioning valve. The proportioning valve functions when one brake line or caliper leaks hydraulic pressure. It will cause the valve's internal piston to slide to one side. This activates the dash brake light and closes off the opposite fluid circuit. When this happens, the closed-off half of the valve will allow little or no fluid to be bled through that circuit.

On a properly functioning proportioning valve, if it slides to one side it will re-center itself during the brake bleeding process using simple brake pedal pressure. It is possible for a poorly functioning proportioning valve to slide to one side and stick. If you cannot re-center it manually, you may need to replace the valve. This is the reason I prefer the gravity brake bleeding method.

It's nice when the questions I get are as thorough as Marco's. It takes all of the guesswork out for me and I am able to help you pinpoint your problem faster. Thanks for the question Marco and enjoy driving your Corvette this summer. **VETTE**

VACUUM PUMP

This is most popular method for professional technicians for brake bleeding. Just remove the master cylinder lid and attach the clear vacuum tube to the bleeder screw. Open the bleeder screws one at a time, in the order described above and the vacuum pump will pull the air and old brake fluid out of the system. All you will need to do is keep the master cylinder full of clean fluid.

→ QUESTIONS?

Got a question for our Tech Corner expert? Just jot it down on a paper towel or a lightly soiled shop rag and send it to us at **VETTE** Magazine, Attn: Technically Speaking, 1821 E. Dyer Rd., Suite 150, Santa Ana, CA 92705. Alternatively, you can submit your question via the Web, by emailing it to vette@enthusiastnetwork.com. Be sure to put "Technically Speaking" in the subject line.



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Over the years, many in the Corvette world have embraced the idea of the restomod. You take an old C1, C2, or C3, and somehow get it to behave like a modern C5 or C6. It sounds like a fairly easy concept, however, some within the hobby have taken issue with the entire practice. The purists who want to see everything reduced to a full nut and bolt restoration cringe every time they see an older Corvette with a modern LS mill stuffed in the engine bay. As a result, this has forced many who seek out project cars to be conscious of not destroying any numbers-matching vehicles. Indoctrinated into this belief, this was the yardstick that Ohioan, Mike Suppo used when he started looking for a donor C2 to build his restomod.

MIKE SUPPO'S '67 RESTOMOD IS A MIX OF NEW AND OLD SCHOOL FLAVORS

BY JOHN MACHAQUEIRO

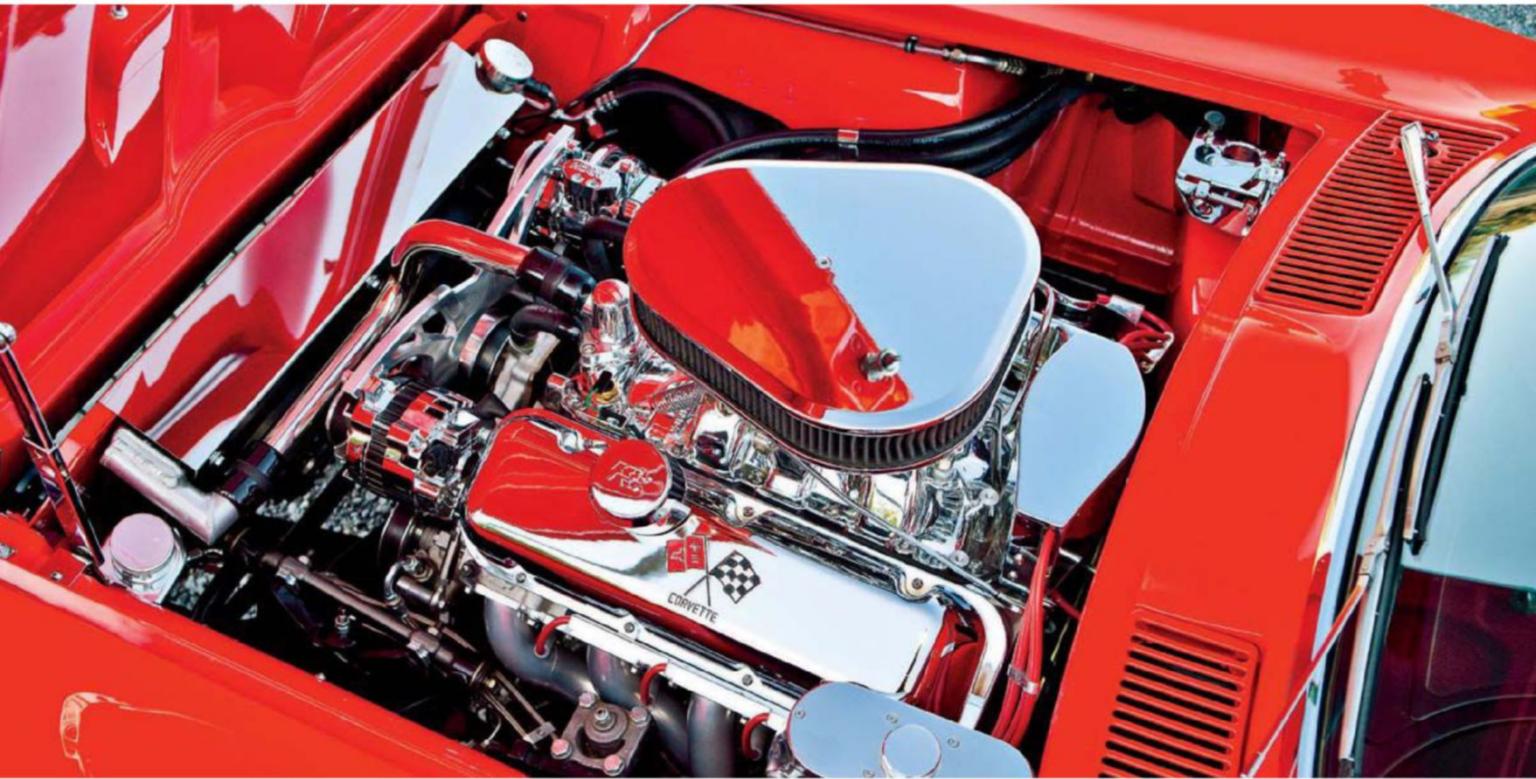




New Old School

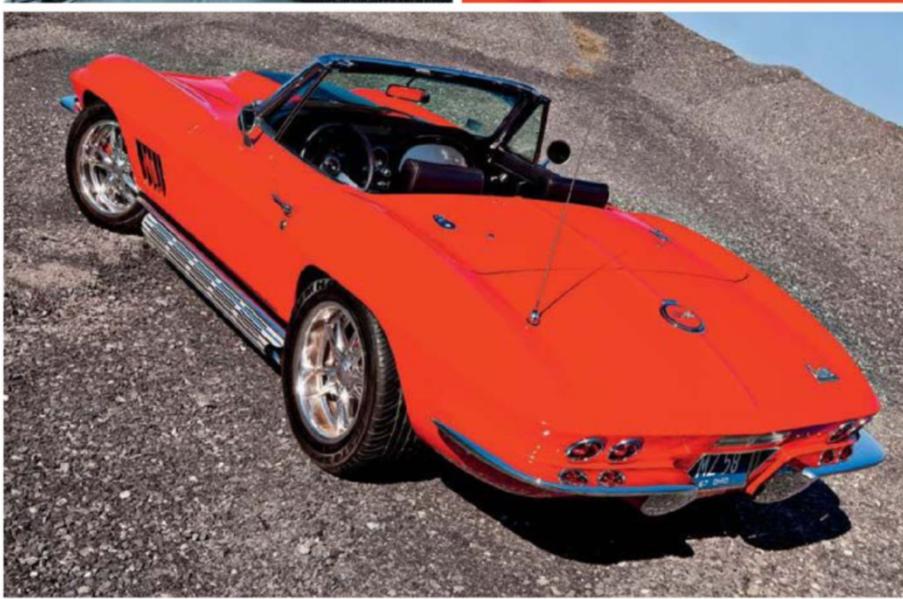
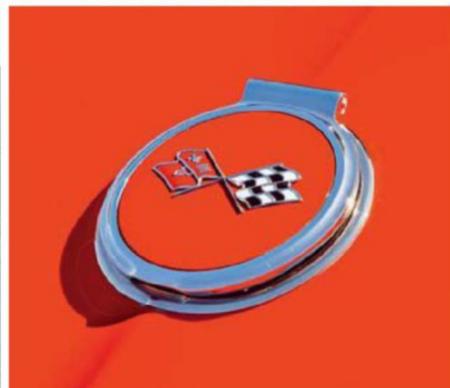
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NEW OLD SCHOOL



Beyond non-numbers-matching, the criterion was quite simple – it had to be a '67. Any other year C2 wasn't in the cards. Knowing what he wanted was the simple part, finding it was the challenge. Turning to the cyber world, Mike found the online Corvette related resources quite useful. An ongoing thread of a C2 build in one of the forums proved to be the ticket, but he didn't know it when it first caught his eye. He began following the regular posts of a '67 located in the San Francisco area. To his surprise, after two years of steady progress on the car, the owner decided to sell it. Not wanting to let the opportunity pass him by, he had someone look at the car. If it was everything that he saw posted online, it would be a keeper.

Having lived up to what was shown in the forum, Mike further adds, "I was told by the owner that the car was originally found in a barn in Texas, and had been sitting for 20 years." It was non-numbers-matching, and was partially disassembled without a drivetrain when found. After it was shipped to California, it kept moving from resto shop to resto shop, and as the money was made available, additional work performed on it. The emphasis was placed on the body and paintwork, which proved to be the biggest selling point. It was that nice! Not so nice was the LS6 that had been stuffed into the engine bay. In what Mike considers a rather bizarre choice, the owner had installed a 454 that was so radical that it couldn't run on anything less than 105-octane race fuel. Further evidence of that poor decision is still visible on the hood. While flawlessly



executed, the need to raise it 1.5-inches was the result of engine clearance issues.

After the deal was finalized, the Corvette was transported to Ohio. Shortly after its arrival, Mike got together with a bunch of friends and repaired issues with the rear suspension to make it driveable during the summer months. "I realized that it wasn't that much fun to drive," he explains. "It was hard to handle, and some of the things done to it weren't right." The LS6 was scary stupid and highly impractical for street use, so he parked the Corvette and they started the teardown. The 454, along with the four-speed, were quickly removed and sent to a new home, followed by a complete gutting of the interior. Initially, the plan was for Mike and his buddies to do the restomod conversion in their spare time, but as is often the case, plans don't always work out as envisioned.

"With every one of my friends and myself being busy with our respective businesses, I decided the most sensible option was to seek out someone to finish the job." That someone was John Drahos, the owner of Corvette Conspiracy in Cleveland. With over 40 years in the Corvette business, John and his crew handle everything from regular maintenance to complete body-off restorations and customs. Over the years, they have cranked out quite a few award-winning cars. His mission with this car was to reintroduce the missing civility that Mike was looking for. When the C2 was dropped off at the shop, the plan was for a partial rebuild. Since the paint was flawless, everything proposed would take place under the skin. It was also decided that, while it was going to be a restomod, the flavor and execution would be decidedly old school.

They started the process by separating the body from the frame, and it was nothing but good news when that happened. The frame was in exceptional condition and the perfect foundation to build on. On this type of build, John explains, "We like to reinforce the frame. There are areas that we like to gusset to stiffen the chassis." After that operation, it was sent out to be mediablasted and then powdercoated. The refurbished frame was then treated to a set of QA1 coilovers mounted on tubular upper and lower control arms up front. At the rear, a Vette Brakes composite mono-spring was installed, while the stock differential with 3.55 gears was retained. Since the car came with the J56 brake option, those were refurbished as well.

After the teeth-jarring experience with the LS6, it wasn't difficult to figure out what direction to go when it came time to choose the propulsion. Keeping it simple and reliable, Mike opted for a plug-and-play 502ci mill from the Chevrolet Performance catalog. Crowned with an Edelbrock aluminum intake and Holley 850-cfm carburetor, this combination lays down some respectable numbers. A Tremec T-56 six-speed was the choice to deliver that power.

The last piece of the puzzle was the installation of the exhaust system. Instead of cracking open a catalog and ordering it, the crew at Corvette Conspiracy went the extra mile and crafted a set of custom headers and side exhaust for the Corvette. Beyond the changes made mechanically, visually under the hood, a great deal of attention to detail is also evident with the installation of a plethora of chrome and polished aluminum pieces that tastefully complement the bright-red paint. While the bling factor is evident when the hood is lifted, the biggest exterior cue that this is a modified mid-year is a set of aluminum Billet Specialties Fury wheels wearing fat Kumho Ecsta radials (225/55ZR17 front, 255/50ZR17 rear).

As pointed out, the body was set aside as the focus was placed on the chassis, however, Mike and his buddies had started cutting the floor for a Tremec but never finished the job. As a result, the shop had to fabricate a new tunnel to work with the Tremec. Once that was finished, the interior was reinstalled.

Aside from the Eckler's leather-wrapped steering wheel and the hidden 600-watt stereo system, Mike estimates that 95 percent of it is still factory original. The C2 was also treated to a new Al Knoch top that was installed at the shop. Other creature comforts such as power steering and Vintage Air A/C are all present in true restomod fashion.

If you're wondering about the paint choice on the car, keep wondering. Beyond it being a rather bright shade of red, no one has a clue as to what the paint code is – not even the previous owner. It is flawless, and a complete mystery.

After six solid months of work on the Corvette, Mike was able to fire it up. The verdict on the changes: unanimously positive. It is now a pleasure to drive with ample amounts of power and great handling characteristics. It has also racked up a number of Best of Show awards, which speak volumes about the overall quality of the '67 and the stellar work done by the guys at Corvette Conspiracy. **VETTE**



[FEATURE]

CONTEMPORARY ELEGANCE

GIL LEBLANC'S DRAMATIC '59 HAS ALL THE MODERN
UPGRADES YOU COULD EVER WANT

BY **CHUCK VRANAS** • PHOTOGRAPHY BY **DAVID CORKUM**



t's easy to say there are two ways you can find your path in hot rodding. One being a gradual road, eventually finding your way to the promised land, and the other being fortunate enough to have been born into it. For Gil LeBlanc of Memramcook, New Brunswick, Canada, growing up in the little town of Lewisville where his dad, Dick, owned the local Texaco station certainly had its perks. He was immediately immersed in the '60s-era car culture with his earliest memories revolving around the time



spent alongside his mentor, forever cementing his passion for anything automotive.

While taking on simple after-school tasks as a youngster at the station, which included cleaning the shop on a daily basis, he'd take his earnings to the local hobby shop to buy scale kits of favorite designs he saw his dad working on at the shop. It's clear this was a launch pad for the real deal as the years progressed. Combine this with Sundays spent at the local dragstrip where he would see his hot rod heroes knock down blistering times on the



[FEATURE]

CONTEMPORARY ELEGANCE

quarter-mile. It was easy to see that dear ol' dad knew the right formula to keep excitement at the forefront with just the right combination of horsepower and nitromethane.

By the time he hit his teens, Gil had a developed passion for muscle cars with his main obsession being the Corvette. Canada in the '60s and '70s was like anywhere else – the hot place to be on any given night was the local burger joint where hop-ups would hang out in parking lots just aching for a challenge on the streets. By the time he was 19 he was able to make a move and finally buy his first Corvette in the form of a heavy-breathing '69 packed with a 427ci/435hp V-8. From that point on it was easy to see his path was set with the proper groundwork already established. As the years passed an endless stream of cars, including numerous Corvettes, Mustangs, and classic trucks would pass through his home shop.

Since Gil always had a passion for the styling of the C1 models, it was obvious the pair would embark on a journey to create one with their own personal touch.

Like any hot rodder, the passion always revolves around the build, which is a value he was also able to instill into his son, Dan. As the owners of Untamed Rods & Customs in Dieppe, New Brunswick, they have been able to bring their dedication for creativity and design to life, creating a bevy of custom rides for their clients. Since Gil always had a passion for the styling of the C1 models, it was obvious the pair would embark on a journey to create one with their own personal touch. To bring it full circle they contacted Eric Brockmeyer Design to render the car and bring it to life. Their idea was to develop a blend of engineering, fabrication, design, and creativity to infuse today's technological elements into one of the automobile world's most revered designs.

After doing all the research, a decision was made to work cutting-edge technology into the base for ultimate handling. A call was made to Art Morrison Enterprises for one of their rock solid GT Sport chassis, which incorporates the suspension dynamics of a modern Corvette to give the car new life regardless if it's on the street or the track. Starting with 2x4-inch rectangular steel, the frame incorporates custom designed crossmembers (including center frame exhaust holes), body and bumper mounts, and engine mount towers. Assembled by team leader Cliff Coombs and Matt Robillard, out back finds a narrowed Ford 9-inch



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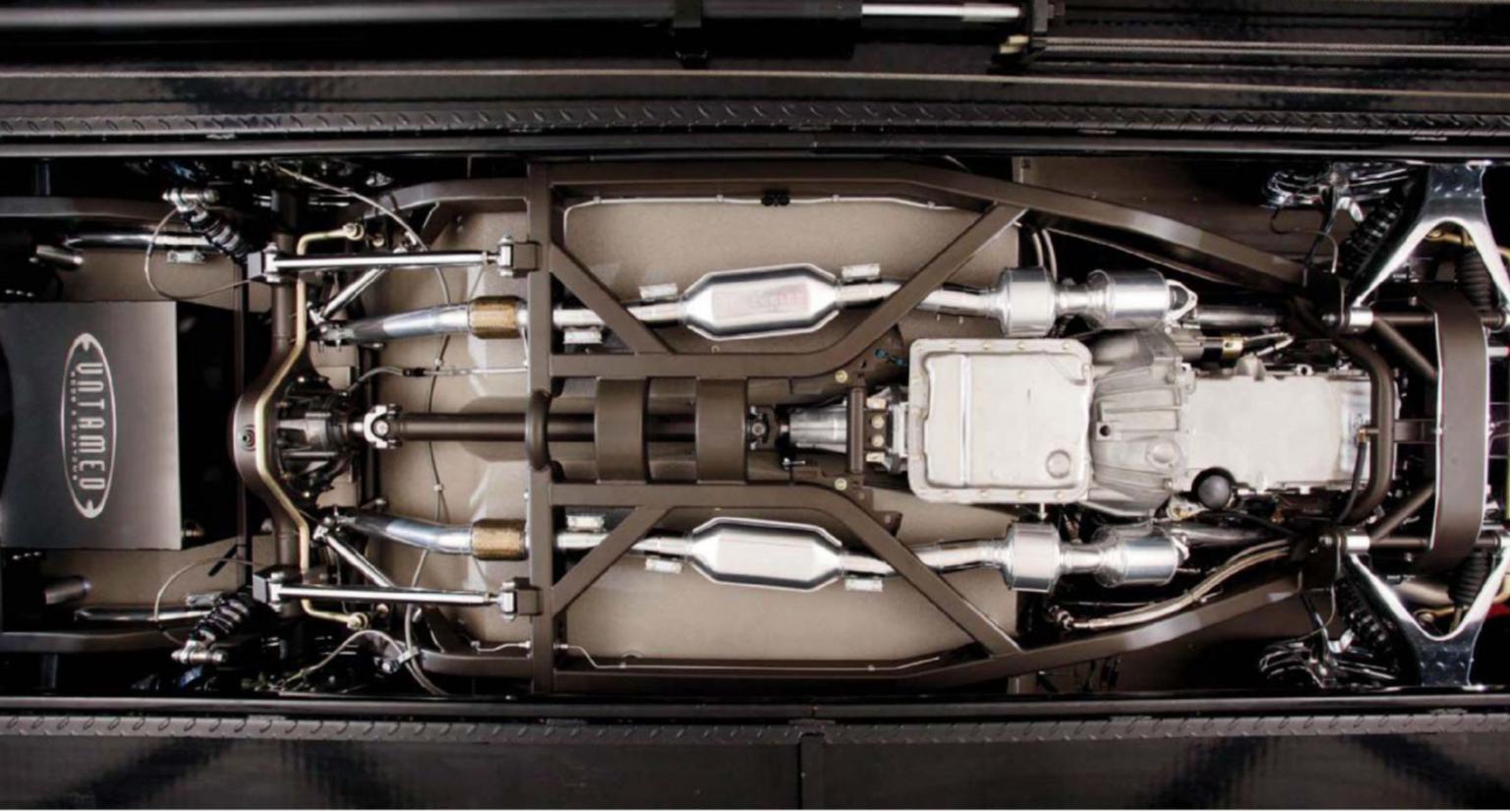
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rear filled with a Strange Engineering nodular-iron centersection wearing 3.50:1 gears linked to matching 31-spline axles. It's suspended in place by an Art Morrison triangulated four-bar and sway bar, deftly matched to Strange Engineering coilover shocks. Moving to the front of the chassis, crisp handling comes from a combination of Corvette C6 upper and lower control arms matched to LG Motorsports 1-inch drop spindles, Strange Engineering coilover shocks, and an Art Morrison sway bar all linked to a power rack-and-pinion unit.

It's one thing to go fast, but when you have to stop on a dime the stock master cylinder and drums aren't going to cut it. A GM twin-bowl power master pushes fluid through custom stainless lines by Remi LeBlanc to Wilwood Engineering four-piston calipers with 13-inch discs out back. C6 Z06 six-piston front calipers and 13-inch discs complement the setup. The entire chassis was then molded and detailed for paint, accented by plenty of polished and plated components. Anchoring the spine to the street are a set of Larry Dove-designed custom 18-inch front and 20-inch rear wheels from EVOD Industries wearing Pirelli P ZERO tires in 245/40R18 and 275/35R20, respectively.

When focusing on the heartbeat for the C1 it was easy to decide on bringing it up to date with a fresh injection of horsepower direct from Chevrolet Performance. The exclusive E-ROD LS3 V-8 generates 430 hp at 5,900 rpm right from the crate. It was a perfect choice to give the '59 just the right blend of seamless horsepower. The engine comes packed with a speed shop full of go-fast goods starting with a cast-aluminum block loaded with a nodular-iron crank linked to powdered metal connecting rods wearing hypereutectic aluminum pistons. Thump comes from a hydraulic roller cam while heavy breathing generates



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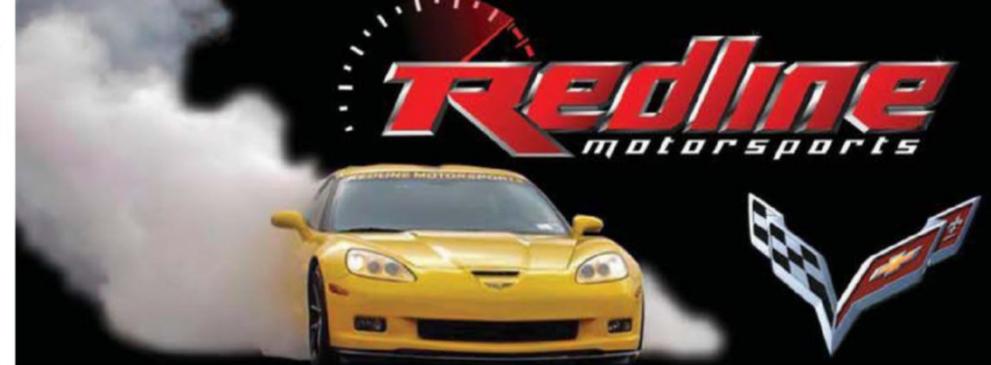
CONTEMPORARY ELEGANCE

through a set of L92-style rectangular-port aluminum heads topped by a complementing EFI to deliver the goods. Spent gasses dump through factory manifolds to a custom stainless 2-1/2-inch exhaust by Robillard to Flowmaster mufflers. The engine was then detailed and massaged to show standards, accented by one-off inner fenders and a firewall by Pierre LeBlanc for a clean, custom look. To move the goods, shifts glide through a GM 4L65E trans to a custom aluminum driveshaft.

Building a custom Corvette is a lot like sculpting a piece of fine art where the right amount of creativity fused with just enough restraint can yield something truly remarkable. When deciding on the body, Gil contacted Downs Custom Performance Automotive for one of its exceptional '59 C1 replicas. Starting with a fresh base, Pierre spent time on exceptional lines and panel fitment, attention to detail, and making the classic design perfect from every corner. Custom stainless trim was fabricated along with the bumpers being massaged and tucked. The rears were treated to custom reverse lights, incorporated into the bumperettes. When it came time to select a paint scheme, Gil wanted the car to evoke a particular subtleness accented by contemporary flair – infusing the past with the present. Pierre worked with Norm Cormier in laying down a smooth coating of Axalta, a custom-blended pewter pearlescent vibe. The paint brought the car to life, highlighted by mile-deep plating from G&G Chrome of Montreal.

To establish an equal amount of elegance into the business office, Pierre got started by first sculpting a custom dash and flowing console while also laying out the American Autowire wiring harness. Al Knock then modified and fitted a set of original seats, lowering the backrests by 2 inches for a more custom fit to the interior. Krist Kustoms of Fort Wayne, Indiana, then came to the shop and stitched up a winning combination of pewter leather, accented by Mercedes dark brown square-weave carpeting. The team at Krist also designed all of the sculpted interior panels, stitched the leather dash, and added their signature medallions to the seatbacks. A Budnik Tri-Oval matching leather wrapped steering wheel linked to an ididit tilt column navigates the path. A Lokar shifter pulls gears, and cool breezes flow from Vintage Air through custom vents. Vitals are monitored via Auto Meter's art deco-inspired Cruiser AD dials while tunes move through Kenwood electronics.

We think that Gil achieved his goal of bringing a level of elegance to the '59 combined with cutting-edge technology to fuse the past and present together in a perfect combination. We can hardly wait to see him and his lovely wife, Rose, putting down the miles now that it's finished. **VERTE**



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[FEATURE]



David Moster is the proverbial “gearhead” and has always been passionate about cars, especially Corvettes. “My stepfather was a huge Corvette fan, and owned one of every generation, minus C1 and C5 (he went from a C4 to a C6). When I was 13 I made a deal with my parents that if I got straight A’s through junior high and high school, they would help me buy a Corvette. Well, I got one B, in 9th grade, so I didn’t get that Corvette. I didn’t complain because I knew my parents didn’t have the money for one, even an older used one, and with my driving at the time, I don’t blame my stepdad for not trusting me with one yet! However, it did motivate me to work hard. I always had a passion for design/engineering, with Thomas Edison as my primary ‘idol’ from a grade school age.” It should come as no surprise then, that he ended up designing jet engines for a living. It has turned out to be a fun career that gave him the funds necessary to fulfill his dream of owning a Corvette.



ALL WRAPPED UP

DAVID MOSTER'S 2003 Z06 IS BLACK AND WHITE AND FAST ALL OVER

BY STEVEN RUPP

PHOTOGRAPHY BY OSVALDO J. SANTIAGO

[FEATURE]

ALL WRAPPED UP



David's 2003 Corvette Z06 started out as just a fun daily driver, but it wasn't long before the modifications started. "When I first started building the car it was just to do anything 'fun' (autocross, road race, drag race, and just street driving), not for any type of racing class. I started hanging out with Danny Popp (owner of Raft Racing, and a well-known Corvette guru) and he convinced me to get more serious about road racing and to build the car for competition in the Ultimate Street Car Association (USCA) events, with the hope of getting a SEMA invite to the Optima Ultimate Street Car Invitational (OUSCI)." This gave David a goal and a set of rules to guide the build, but it also ratcheted up the build to a whole new level. Competing in the OUSCI is running with the big dogs and if you want any chance of doing well then your car needs some serious performance.

"I liked to autocross it a bit and occasionally hit the dragstrip. Then I decided it needed a bit more power and put an intake and exhaust on it, followed by a camshaft, all just to be faster than my friends. After a while, I decided it was time to make serious power and got an LS3 block, a great set of heads, and a host of goodies from LG Motorsports, including a G6X3 camshaft. I put together my own custom dry kit for a 150 shot, and hit the dragstrip. I was addicted to horsepower at this point and nearly every penny had been spent on the engine alone, with the rest of the car stock, aside from used Sparco seats I picked up, and some used CCW wheels. The result was a car that made 500 rwhp/460 tq on motor, and 630/710 on a 150 shot. I borrowed Danny



Popp's CCW Drag Pack and went to the dragstrip. It ran a best quarter-mile of 10.56 at 127 mph with a 1.56 60-foot time, missing Fourth gear and having to coast the last few hundred feet across the line. The best trap speed I recorded was 132 mph, but I had messed up the launch and had a 10.8 e.t. Then at the next, and last, test and tune day, I hurt the motor. I hadn't gapped the piston rings [for nitrous] when I assembled the motor, thinking I wouldn't need to for a 150 shot. I was wrong.

The gap closed and cracked the ring land off on the number seven piston," recalled David.

While "rebuilding" the LS3 the snowball effect kicked in and soon, with the help of his friends, it morphed into a very stout 416-inch stroker. The bores were honed out to 4.070-inches and a 4-inch forged Callies crank and matching 6.125-inch rods were added to the mix. After much discussion, David settled on a COMP hydraulic roller cam with 247/255 duration (at 0.050) and 0.624-inch lift at 113+3

LSA. A set of +3cc Wiseco slugs help achieve the 12.0:1 compression ratio and the short-block was capped with a set of Trick Flow 235cc heads that had been massaged by Brian Tooley Racing. A Nick Williams 102mm throttle body helps stuff atmosphere in and spent gasses exit through a set of LG Motorsports Super Pro 1-7/8-inch headers and Stainless Works 3-inch mufflers. And, using the “what the hell” philosophy, he also upped his nitrous system to a 300hp capable wet shot. The engine made 551 rwhp and 490 lb-ft of torque on a Dynojet, without the nitrous!

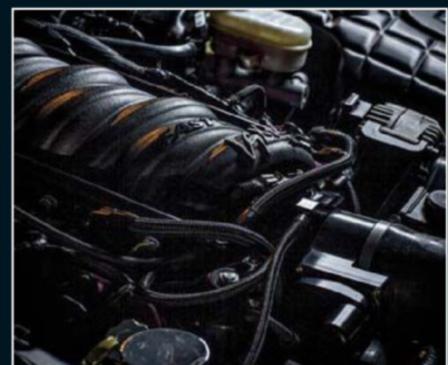
Danny Popp helped David dial in the handling and gave a ton of advice to David who mostly wrenches on the car himself. He also started getting driving tips from Danny and hitting all the local HPDE and open track events. In late 2013 he got serious about running in the Ultimate Street Car Association (USCA) events, which are qualifiers for the OUSCI held after SEMA. David recalled, “I wanted the car to have a fresh look, but didn’t want a new paintjob, so I went to Spade Kreations for a flat-white wrap, knowing they really were the best in the business. The great guys from Forgeline hooked me up with a set of GA3R wheels (18x11 front and 18x13 rear), which really completed the exterior transformation. For tires I chose BFGoodrich Rivals in 315/30 front and 335/30 rear. The brakes were kept simple with the addition of C6 Z06 pieces fitted with Hawk pads.

“After my first HPDE event, with the new performance parts, I knew I was hooked. Then in May I competed in the Midwest Musclecar Challenge and won awards for Fastest Novice and Top Speed Overall on the front straight. I knew the Corvette was coming together, but realized I needed to start replacing the tired stock suspension if I wanted to get faster and get a SEMA invite. JRi hooked me up with a set of double-adjustable shocks, and Danny helped me find some used Pfadt bars and

VB&P springs. Danny also convinced me it was time to upgrade the driveline, and introduced me to George at Rockland Standard Gear, who built the six-speed Tranzilla (ZR1 gear ratios) for me. My friend Ray Bulach introduced me to Jeremy Jones at RPM Transmissions and soon I had one of their Level 4 differentials with 3.90 gears and Raft Racing cooler.”

Things were going great for David and his track-monster Z06, but then “stuff happened.”

As David explained, “I tend to drive pretty aggressive and had a 12/10ths moment at the Holley LS Fest. Running the Vette into the wall took me out of contention for the SEMA and the OUSCI event, which was not fun at all. But it did motivate me to get more seat time and try again this year.” So, if you’re running at any track events in Ohio, or just cruising down the highway, and see a flat-white Z06, just remember the proverb about judging books by their covers. **VETTE**





ARE THEY REAL?

WE DRIVE THE DREAM GIVEAWAY CORVETTES

WORDS BY **WALT THURN** • PHOTOS BY **THE AUTHOR**

As the price of new and vintage Corvettes continues to climb, most people can only dream of owning one. The Corvette Dream Giveaway provides you with a way to win two Corvettes. Using Corvettes for fundraising has proven to be one of the more successful ways to raise money for non-profit organizations like schools, churches, communities, and even the National Corvette Museum. Team Vette has been intrigued watching the frequent Corvette Dream Giveaway television ads. It shows two gleaming Corvettes with a lucky winner excitedly telling the audience how they won both cars. Being a nosy journalist, it seemed like a good story to pursue.

The big question is: are the cars real and do they run? To find out we contacted Mark Breiner who, along with Patrick Meehan, own DG Group. The company licenses the Dream Giveaway brand, handles the promotion for

the sponsor charity, and selects the prizes. To date, Dream Giveaway promotions have provided over \$10 million in funding for more than 13 charities.

Thomas Bever of Hurricane, West Virginia, was the last giveaway winner of a black 1963 split-window coupe and a black 2014 Lincoln-tinted Performance modified Z51 Stingray coupe. Thomas is the person we saw on the Corvette Dream Giveaway television ads. New Beginning Children's Homes was the recipient of the funds after expenses for the campaign (cars, advertising, staff, etc.). Mark told us the next Corvette Dream Giveaway will also benefit New Beginning Children's Homes and designated grant recipients.

The new campaign began in early April and will end on December 30, 2015. So like any good Corvette fanatic, the big question to Mark was what are you giving away? He told us, "The first car is a Rally Red 'Top Flight' National Corvette Restorer Society (NCRS)



When both cars are sitting side-by-side it is obvious how far the Corvette technology has progressed since 1967. However, the original Sting Ray is still among the most timeless designs ever introduced by General Motors.

LIFESTYLE

ARE THEY REAL?



This automatic Z06 has been clocked at 0-60 in 2.95 seconds and an e.t. (elapsed time) of 10.95 at 127 mph!



Forty-eight years after this car left the St. Louis Corvette Assembly plant it's still turning heads whenever it is seen driving down the street. The noise the big-block makes coming out of those side pipes was music to this Corvette enthusiast's ears.



The C7 Z06 with the Z07 option is a study of downforce aerodynamics. The high rear end coupled with the adjustable spoiler is designed to keep this car planted during hard cornering. The C2 on the other hand has a tapered rear with a long, flat horizontal nose that creates lift. Zora Arkus-Duntov pushed to end production of this design in 1966 only four years after it was introduced in 1963. Production problems with the C3 delayed its introduction until 1968. Today, the 1967 model is the one of the most sought-after Corvettes.

1967 L71 (435/427) four-speed coupe. Its VIN is 194377S108467. When it was new it was purchased from Frank Grohs Chevrolet in Detroit in early 1967. This car received a frame-off restoration and is in perfect mechanical condition. Our second giveaway car is a Torch Red 2015 Lingenfelter Performance Engineering prepped Z06 fitted with the new eight-speed automatic transmission. The Z06 has the Z07 option that includes carbon brakes, sticky Michelin tires, and an extensive aero package. Lingenfelter added an oversized pulley to the engine, air intake, and a custom tune to this already powerful Corvette. It carries VIN 1G1Y52D61F5602918." We were told that the advertised value for the cars is \$105,000 for the C2 and \$100,000 for the C7. In addition, \$50,000 will be given to the winner to help pay the federal income taxes. That brings the package total to \$255,000. It costs \$3 to enter (tax deductible), but the

more entries you select the lower the suggested donation. For example, for a suggested donation of \$100 you get 100 entries. You can enter as many times as you like. Get more giveaway details by calling toll free at 877-700-8946 or online at www.winthevettes.com.

Mark invited us to come and inspect, photograph, and drive the cars. We set up a meeting time and place and can confirm absolutely that these are real cars. The 1967 is a basic no-frills fiberglass rocket packed with a big engine and no air conditioning. The paint is stunning and the restoration was very well done. We can see why it got a Top Flight NCRA award. What can I say about the new Z07-equipped Z06? This is the first eight-speed automatic Z06 that we have seen and when Mark gave us the key fob, it was giddy-up-and-go time. This car is crazy fast at low speeds, the automatic shifts seamlessly and it builds speed so quickly you are thankful it



Carbon-ceramic brake rotors, black motorsports wheels, and Michelin Pilot Sport Cup 2 front tires (285/30ZR19) fill up the wheelwell.

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LIFESTYLE

ARE THEY REAL?

has the big carbon-ceramic brake package. The amazing thing about this car is during normal driving it is quiet, comfortable, and not the least bit fussy. It is truly an amazing supercar. I wisely decided to let Mark drive the rare C2, but was still able to make some observations about this legendary Corvette. It had no power steering or power brakes, so Mark had to work hard to park it and stop it. The ride is nowhere near as compliant as the Z06, but the stares it received on the highway were worth the price of admission. This is truly a legendary Corvette and any of us would be proud to own both of these amazing cars. It would be fun to start buying tickets, but you would never let me hear the end of it if I won. However, the cars are real and are in perfect running order. If you enter, you might be driving these two amazing Corvettes after the prizes are awarded. The promotion ends December 30, 2015. Good luck! **VETTE**



The coveted National Corvette Restorers Society sticker is proudly displayed on this "Top Flight" certified Dream Car Giveaway Corvette.



This 427 emblem was the badge of honor for any Corvette owner, and something that caused fear for most people that pulled up beside it at a red light.



No frills in this interior, just a big chrome shift handle, and a large tach redlined at 6,500 rpm, and plenty of room to make speed shifts!



Twenty 1967 coupes were equipped with the legendary L88 430hp engine and sold only to racing teams. The L71 engine in this Corvette was the highest performing street engine sold to the public. In 1967, the backup lights were moved from the inside tail-lights to the center above the license plate.



It was amazing how Zora and his team of engineers packed so much engine into the tiny Corvette engine compartment. The restoration team did an amazing job making this engine look original and brand-new.



Lingenfelter Performance added an oversized pulley and custom tune. The new air intake had not been added when this photo was taken.



The Z06 interior is all business, but with all of the added comfort features that you come to expect in a \$100,000 supercar.

Urgent: Special Summer Driving Notice

To some, sunglasses are a fashion accessory...

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Drivers' Alert: Driving can expose you to more dangerous glare than any sunny day at the beach can... do you know how to protect yourself?

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Not all sunglasses are created equal. Protecting your eyes is serious business. With all the fancy fashion frames out there it can be easy to overlook what really matters—the lenses. So we did our research and looked to the very best in optic innovation and technology.

Sometimes it does take a rocket scientist. A NASA rocket scientist.

Some ordinary sunglasses can obscure your vision by exposing your eyes to harmful UV rays, blue light, and reflective glare. They can also darken useful vision-enhancing light. But now, independent research conducted by scientists from NASA's Jet Propulsion Laboratory has brought forth ground-breaking technology to help protect

human eyesight from the harmful effects of solar radiation light. This superior lens technology was first discovered when NASA scientists looked to nature for a means to superior eye protection—specifically, by studying the eyes of eagles, known for their extreme visual acuity. This discovery resulted in what is now known as Eagle Eyes®.

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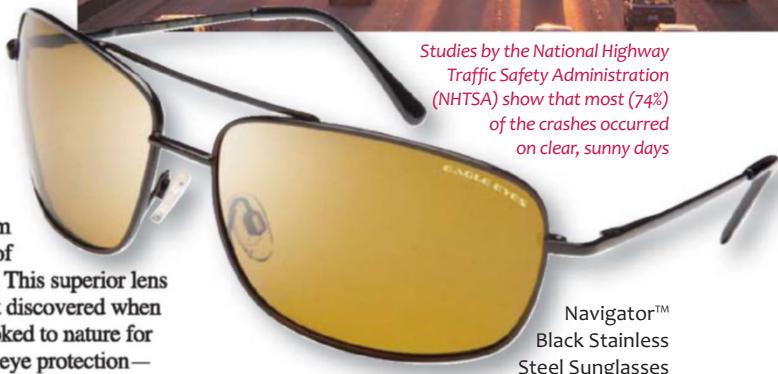
If you are not astounded with the Eagle Eyes® technology, enjoying clearer, sharper and more glare-free vision, simply return one pair within 60 days for a full refund of the purchase price. The other pair is yours to keep. No one else has such confidence in their optic technology. Don't leave your eyes



Slip on a pair of Eagle Eyes® and everything instantly appears more vivid and sharp. You'll immediately notice that your eyes are more comfortable and relaxed and you'll feel no need to squint. The scientifically designed sunglasses are not just fashion accessories—they are necessary to protect your eyes from those harmful rays produced by the sun during peak driving times.



Studies by the National Highway Traffic Safety Administration (NHTSA) show that most (74%) of the crashes occurred on clear, sunny days



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TREND SETTING—PART 9

A LOOK BACK AT
CHEVROLET'S EXPERIMENTAL,
PROTOTYPE, CONCEPT CAR, AND
SHOW CAR CORVETTES

SCOTT TEETERS WORDS | ILLUSTRATIONS

General Motors makes hundreds of kinds of cars and trucks. Some sell hundreds of thousands of units a year, which makes Chevrolet's Corvette a complete enigma. Given the small number of Corvettes sold every year, it is a modern American manufacturing miracle that the car survived for 61 years.

The Corvette was "officially" born on January 17, 1953 at the GM Motorama Show at the Waldorf Astoria Hotel, in New York. To understand the impact of Harley Earl's two-seater sports car concept car, you have to look at typical cars of 1953. The car was low and sleek, and wasn't over festooned with styling gimmicks. Based on the response from attendees, Chevrolet rushed the car into production, and the rest is history.

Today, the Corvette is GM's flagship car. When Chevrolet unleashes a new Corvette, the automotive world stops to take notice. But things were not always this way. Up to the C4, there were many inside GM that wanted to see the Corvette go away. For the first 20-some years, the car suffered from an identity crisis. Inside GM there were always those that wanted the Corvette to be something different; a lightweight sports car, a mid-engine car, a rear-engine car, a four-seater personal luxury car, powered by a boxer-type flat-six, Wankel rotary-powered, turbocharged small-displacement hemi-headed double-overhead cam powered, and even an all-aluminum car. Chevrolet kept the loyal faithful stoked with two or three experimental, prototype, show car Corvettes per year. From an enthusiast's perspective, this was endlessly fascinating.

This is the part nine of a chronological look back at Chevrolet's high-profile experimental, prototype, concept car, and show car Corvettes. "Racing" has lead the way in the design and development of the Corvette ever since

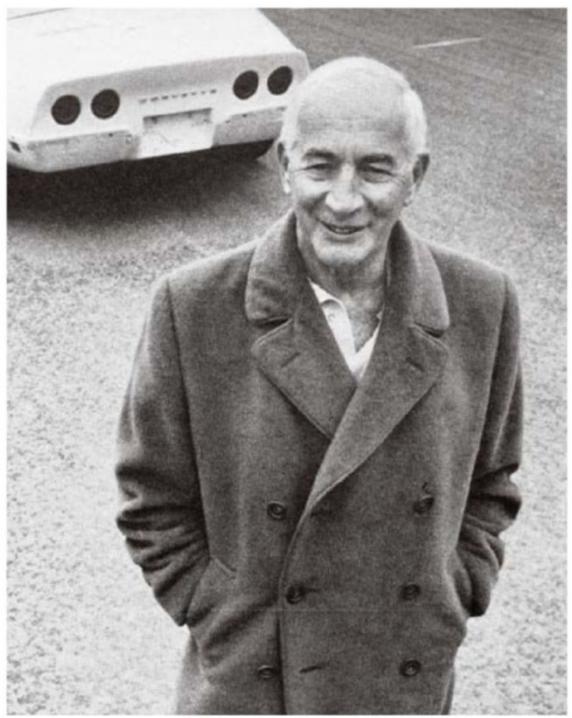
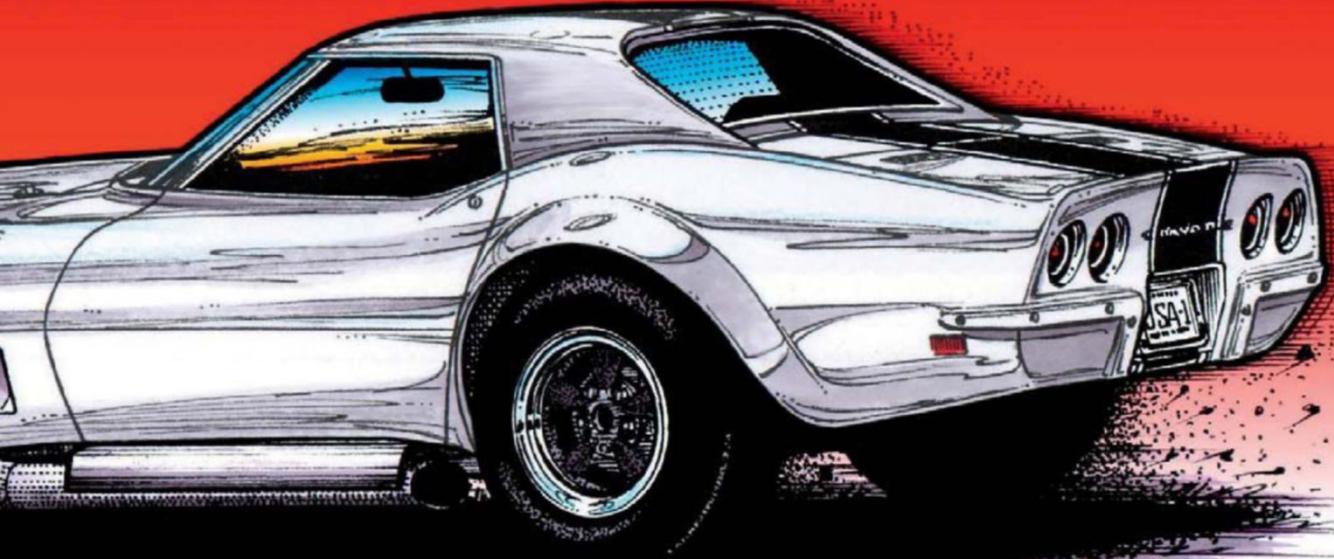


IMAGE © CAR LIFE MAGAZINE

69 ZL-1 RACER



EXPERIMENTAL CORVETTE

January 1956 when Zora Arkus-Duntov took a modified 1956 Corvette to Daytona Beach and racked up a two-way average speed of 150.583 mph. This was the opening act for the Daytona Speed Weeks event the following month where Zora then took three heavily modified '56 Corvettes and put the Corvette on the map, with driving help from John Fitch and Betty Skelton. The die was cast and street Corvettes would forever be linked to racing Corvettes. After GM decided to adhere to the AMA mandate that carmakers not participate in racing, Duntov always made sure Corvette owners had the right hardware if they wanted to race their Corvette. To facilitate the production of his "racer kits," engineering development cars (race cars) had to be made. Here are Duntov's last three racer kit development cars. Very little info, and even fewer pictures exist of these cars, which is a real shame.

Duntov's 1969 427 ZL1 A/ Production Racer

Roger Penske stunned the ranks in 1966 when he entered a preproduction aluminum-headed 427 L88 '66 Corvette coupe in the

24 Hours at Daytona race. The following year, RPO L88 was on the '67 Corvette order form. The L88 was a full-package: engine, heavy-duty drivetrain, suspension, plus a few weight-saving deletes. And best of all, it was a work-in-progress, with the ultimate goal of offering an all-aluminum version of the big-block engine.

The prospect of massive amounts of big-block horsepower and torque, at small-block weight was irresistible. The all-aluminum engine was on Duntov's "wish list" since 1957 as part of his proposal for the Q-Corvette that also included fuel injection and a transaxle—sound familiar? The all-aluminum small-block was tried in the early '60s within the Grand Sport program. Unfortunately, the basic small-block, while strong enough as a cast-iron piece, wasn't designed to cast in aluminum and then race. However, for the Mark IV big-block, it was a piece of cake. The ZL1 engine made its debut on the cover of the December 1968 issue of *Hot Rod* magazine, followed by the

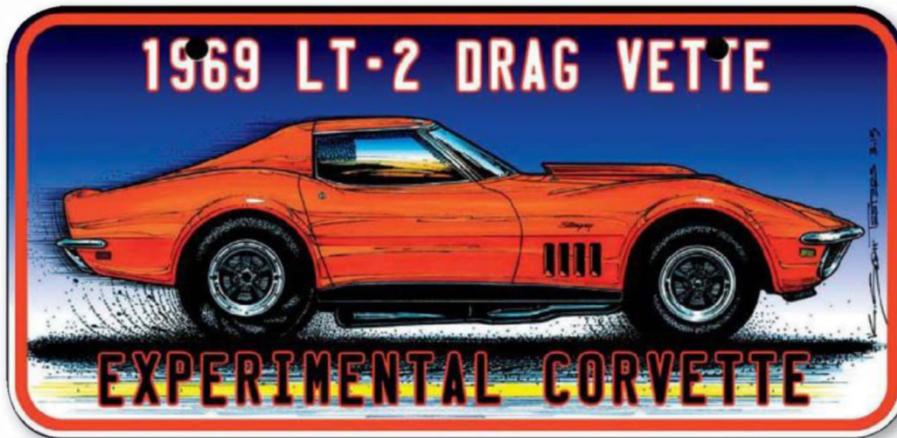


IMAGE © CAR LIFE MAGAZINE

baddest-looking racing Corvette seen since the modified version of the 1963 Grand Sport.

In the summer of 1968 when the automotive press arrived at the Milford test facility to preview the '69 cars, they weren't prepared for Zora's latest toy: the ZL1-powered 427 Corvette. But this wasn't like the '63 Z06 Corvette that looked like any other "regular" '63 Corvette. This thing screamed "RACE CAR!" The only thing missing from Zora's white ZL1 Corvette was sponsor decals and numbers. The car had killer looks and the grunt to match.

The objective was simple: take one L88 Corvette roadster, plus select aftermarket



performance hardware, and build it like a racer would. Everything that didn't belong on a race car was removed. When completed, Duntov and his crew had reduced the weight of the car by about 400 pounds to approximately 2,965 pounds—the ZL1 engine by itself saved 175 pounds. Missing production items included the radio, heater, insulation, headlights, radiator shroud, upholstery, rear bumpers, and cast-iron exhaust manifolds. Racing equipment included 9.5-inch wide magnesium wheels, shod with 10.5-15 front and 12.5-15 Goodyear racing tires, the ZL-2 cold-air induction hood (aka, the L88 hood) with hood pins, and L88 fender flares. Header sidepipes essentially uncorked the potential of the radical, "off road" ZL1 engine. This must have been a fun project for the young engineers. Duntov himself gave journalists "believer rides." When coaxed to make a drag racing run, Zora clicked off a 12.1 e.t. at 116 mph using 3.60:1 gearing. Lower 4.11:1 or 4.88:1 gearing, with drag racing-style speed-shifting would have surely put the car into the low-11s.

Later at GM's Phoenix test track, journalists got to actually drive the white ZL1 on a short road course. *Road & Track* described the car's performance as being "close to a Group 7 racecar" they had driven shortly before. Earlier, Zora had the hood blow off while performing a speed test at 180 mph! Duntov's quasi-ZL1 racer was a shining example of the ZL1's potential. How unfortunate that the L88/ZL1 wasn't made as a separate Corvette model, similar to what was done with the C5 Z06 and then the wide-body C6 and C7 Z06. Duntov explained the reason the fender flares were separate pieces that came with the cars in the trunk area. At the St. Louis assembly plant, Corvette bodies were held in a jig and then lowered onto the chassis, and Chevrolet couldn't justify a separate jig just for a few hundred race cars.

After the initial splash, Duntov's quasi-A/Production ZL1 race car disappeared. Many asked what became of the car, but no real answers have ever been found. Most likely, the good parts were removed and the rest of the car was destroyed. Otherwise, Chevrolet

would have surely shown it at the big Corvette shows. However, Kevin "Mr. L88" Mackay is considering building a replica of the car. Considering all of the early Corvette racers Mackay's shop, Corvette Repair, has restored, he'd be Da' Man.

1969 454 ZL-1 Drag Corvette —The Great Pumpkin

Also on hand the summer of 1969 as part of the '70 press preview was a menacing looking Monaco Orange Corvette wearing 10.65-inch drag racing slicks. The car was there the year before as a "regular ZL1." Engineer Gib Hufstader said that the only purpose for cars such as this was to impress the reporters. Forty-six years later we're still talking about this!

The heart of this drag Vette was its experimental LT-2 engine—essentially a bored, all-aluminum 427 ZL1. The engineers tinkered with compression ratios, valve seat angles, and the intake manifold was modified to accept a huge Holley 4500 NASCAR carb rated at 1,400 cfm. Most interesting was the 180-degree header system that paired cylinders that fired 180-degrees apart. The system didn't work

any better than regular drag headers with collectors, but sounded like an Indy or Le Mans racer. Everything else under the hood was pretty much stock L88, which is already a lot.

To make life easier for journalists, a Turbo 400 automatic transmission with a 2,800-rpm, high-stall torque converter was used. Drag racing 4.88:1 gearing ensured quick, off-the-line acceleration. Those lucky enough to be on hand weren't prepared for the awesome power of this uncorked, big-block. To manage rear-wheel hop, the car had the F-41 rear spring with two leafs and F-41 shocks. A 2-inch metal block was mounted to the top of the hub carrier, which after traveling 2 inches met a 3-inch rubber bumper. The American Mags—8.5-inch in the back—were shod with 10.65 x XS-12 Racemaster slicks and the 7-inch wheels on the front were shod with stock tires. Gib Hufstader did the transmission work and Tom Langdon built the LT-2 engine that, according to Gib, produced 584 horsepower (which seems a little low)!

How good was the 1,320 ride? There were a total of 71 runs, with a best run of 10.89 at 130 mph and an average of 12.13. Trap speeds are an indicator of plenty of power. Why the soft average e.t.? Most guys just smoked the Racemasters—a real e.t. killer. Proving Grounds PR guy, Bob Clift said, "We all enjoyed driving that car. That was back in the good old days, Zora used to keep us all excited back then. We were revving it up to 6,000 rpm, then dumping it into gear (a neutral start). It took off like a stripped-ass ape!" After the fun was over and the transmission was pulled, engineers found stress cracks where the flywheel attached to the crank. It was about ready to let go! A similarly equipped ZL1 Camaro prepared by Dick Harrell ran 10.21 at 133 mph at Kansas City International Raceway. It seems unbelievable that GM would allow something like this to happen—letting auto writers drive a monster car such as this.





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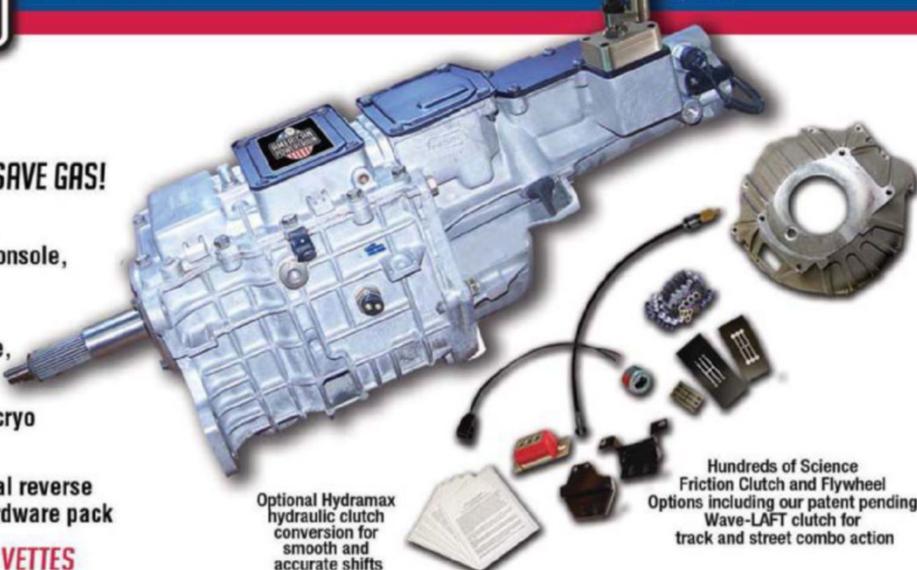
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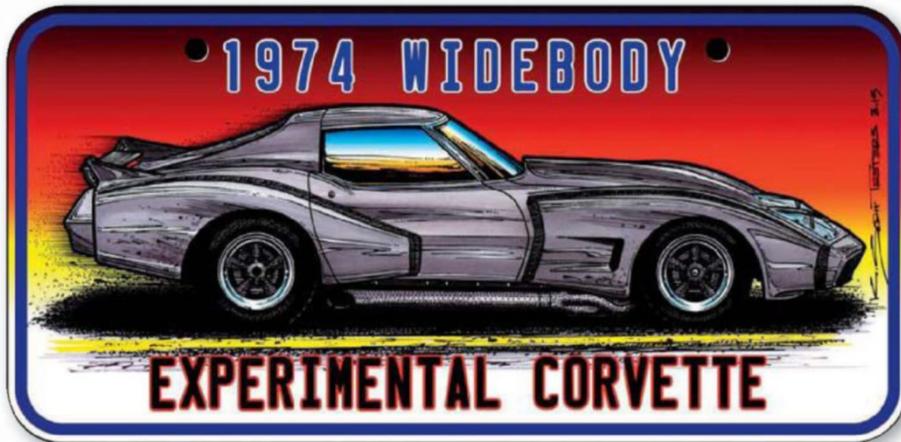


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The obvious next question is: what happened to the mighty LT-2 454 Corvette? Odds are that after the event, the good parts were removed and the rest sent to the crusher—the usual fate for cars such as this. But lament not! The car was covered in October 1969 issue of *Motor Trend* magazine and left a lasting impression on Dave Miller, of Shell Beach, California. Dave traced the serial number of the engine back to Corvette engineer and enthusiast Kevin Lambert, in Michigan. Lambert arranged a dinner with Miller and former Chevrolet engineers Gib Hufstader and Tom Langdon. By the end of dinner, Miller was convinced to build a replica.

Dave's replica is very close to the original, right down to the 180-degree headers. Werner Meier, of Masterworks Automotive Services, in Madison Heights, Michigan, performed the construction of the replica. They even replicated the "rough around the edges, cobbled together" look. The 454 LT-2 clone pulls a little stronger than the original—624 hp on the dyno and has run a best of 10.84 at 124 mph. Such is the passion that these kinds of one-off Corvettes inspire in the Corvette community.

Duntov's Last Corvette Racer Kit — Batmobile

In 1974, Zora Arkus-Duntov was one year away from GM's mandatory retirement age of 65. Twenty-one years before, Zora saw Harley Earl's Corvette at the 1953 Motorama and later said that it was the most beautiful car he'd ever seen. It's what motivated him to seek employment at GM. The only job he was interested in was to be an engineer on the Corvette. Knowing that his time at GM was limited, Duntov wanted to do one last Corvette "racer kit."

The L88 racer kit, and later the all-aluminum 427 ZL1, was a huge success that brought a lot of racing glory to Corvettes from 1967 through the early '70s. It was also a time of tremendous advancements in racing technology. Road racing cars were running on tires that were unimaginable just 10 years before. The factory L88 flares were adequate,

but the tires were getting too big for the big fender bulges. In the early '70s, John and Burt Greenwood were the lead guys in Corvette racing, taking the cars into the realm of "purpose-built" race cars. Many were asking of the Greenwood cars, "It looks like a Corvette, but besides the engine, where's the Corvette?" Ever the innovator, John Greenwood suggested to Duntov that a widebody kit could be developed that would cover the widest tires and generate additional downforce. Enter Duntov's final "racer kit"—the widebody.

Duntov called it his "silhouette racer" and set Randy Whittin at GM Design to the project. The front fenders were wedge-shaped and fanned out to the front edge of the doors. The rear fenders were also wedge-shaped and ballooned into large pontoon shapes, large enough to cover 20-inch-wide slicks. An adjustable wing was added to the back for additional downforce. Whereas in the early '60s race car designers were concerned with reduced frontal area, with massive amounts of horsepower and huge sticky tires, "downforce" was the new objective. With huge racing tires, broad shoulder fenders, and a deep front air dam, the look was beyond menacing. Diversified Glass Company made the prototype parts and the widebody kit was included in the Chevrolet Power Manual. Greenwood then contracted with Diversified and started selling body kits as part of his burgeoning Corvette race car business.

Of course, it all starts with an engineering prototype. While not an all-out race car like the '69 car, it was close enough to make the troops stand back! The mule car was based on a production '74 Corvette and was powered by a balanced and blueprinted cast-iron ZL1 variant with open-chamber heads, header side pipes, a big Holley double-pumper carb, and the L88 cold-air induction hood. Clear plastic headlight covers over quartz-iodine headlights were used and oil coolers were behind the mesh-covered front grille openings. The body kit parts were riveted to the stock body and the seams covered over with



IMAGES BY MARTYN L. SCHORR

200-mph duct tape. Lowered and wearing magnesium racing wheels and tires, this was one bad-ass-looking Corvette with that "cobbled together" look.

Marty Schorr (founder and first editor of *Vette* magazine) was the editor of *CARS* magazine at the time. As the editor of a popular enthusiast magazine and partners with Joel Rosen's Baldwin Motion Super Cars enterprise, Marty had a nice working relationship with Duntov. One day while visiting Duntov in Detroit, Marty got a ride in Zora's latest and last Corvette beast. As Marty tells the story, "One day, he took me out on the high-speed oval test track. We were going full-tilt, with the tail slightly out, while he had a cigarette in his mouth, explaining suspension geometry and big-block engine development! He had great control of this animal car. He was so 'out there' that many times he was banned from the test track."

There was no published record of the prototype's performance, and aside from *CARS* magazine and later *Vette Quarterly* (*Vette* magazine's original name) Duntov's "silhouette racer" got little attention, but the Greenwood brothers "Batmobile" sure did. Overnight, almost all road racing C3 Corvettes were wearing the widebody kit. Greenwood's Sebring '75 Corvette holds the official all-time highest speed on the banking at Daytona International Speedway of 236 mph, set on February 2, 1975. And what of Duntov's engineering prototype? Like Zora's white '69 ZL1, it was never seen again after 1974. Most likely, the good parts were removed and the rest sent to the crusher. While the car holds a prominent place in this series of experimental and prototype Corvettes, because it had so little attention and is so relatively unknown, to date there have been no published reports of a replica in the making. Attention builders! Here's an opportunity for you! **VETTE**



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After the 2016 overview was completed in the conference room, the audience moved outside to inspect early build 2016 models. This Jet Black Design Package Z51 convertible was one of the early build models on display. It was painted Blade Silver and featured Jet Black wheels with a red stripe and red calipers.



Here is a close look at the Jet Black Motorsports wheel that is fitted to a Blade Silver Z51 convertible.

NCM BIRTHDAY BASH

WORDS BY WALT THURN • PHOTOS BY THE AUTHOR

NEW 2016 CORVETTE OPTIONS, SINKHOLE UPDATES, CALLAWAY'S 750+ HP Z06, AND C7.R EDITION UNVEILED

When the redesigned seventh-generation Corvette was introduced on January 13, 2013, its boldness startled the motoring press and Corvette enthusiasts alike. Suddenly, buyers flocked to the showroom and bought 37,288 versions of the new Stingray. The demand has not slowed for 2015. With the addition of the 650hp Z06, the total production for the 2015 Corvette will probably exceed the 2014 total. For 2016, the Corvette group decided to add more option packages for customers to choose from.

These changes were introduced at the annual National Corvette Museum's Birthday Bash on April 23-25, 2015. The Bash began in 1998 and each year the event introduces the next year's version of the Corvette. Chief Engineer Tadge Juechter, Harlan Charles, Jeff Lamarche, and Ryan Vaughn provided a detailed look at the new model changes. The changes will include two new exterior colors (Long Beach Red and Corvette Racing Yellow), a blade style wheel, and three new personalization packages. These packages require the 3LT interior on the Stingray and the 3LZ interior on the Z06. Here are the details:

SPICE RED DESIGN PACKAGE (RPO ZLE) INCLUDES:

Deep Red interior	Convertible top is Spice Red
Polished Motorsports wheels on Stingray	Spice Red brake calipers
Shark Gray vents (except on Long Beach Red Metallic)	Exterior color choices: Shark Gray, Blade Silver, Arctic White, or Long Beach Red Metallic
Optional Blade wheel with Pearl Nickel finish	

TWILIGHT BLUE DESIGN PACKAGE (RPO ZLD) INCLUDES:

Shark Gray vents	Black or Gray brake calipers
Chrome exterior badges	Optional tri-color stripe package
Convertible top is blue with Shark Gray tonneau inserts.	Optional Blade wheel with Pearl Nickel finish
Twilight Blue full-color interior	Exterior color choices: Shark Gray, Blade Silver, Arctic White, or Night Race Blue

Chief Corvette Engineer Tadge Juechter and other Corvette staff members explained the changes that were made to the C7 for 2016. The NCM conference room was packed with people who listened and asked the experts questions about the changes.





These two-tone gray suede seats are shown inside the Jet Black Design ZLG convertible. The flat bottom steering wheel will be standard on all 2016 Corvettes.



This base Laguna Blue convertible is fitted with a Twilight Blue top and includes a GM accessory color-matching rear spoiler, front splitter, and rocker panels.

JET BLACK SUEDE DESIGN PACKAGE (RPO ZLG) INCLUDES:

Satin Black wheels with red stripe	Red brake calipers
Satin black hood extractor and graphic	Convertible top has is black
Exterior color choices: Black, Blade Silver, Arctic White, or Torch Red	Jet Black suede microfiber interior with suede microfiber steering wheel and shifter.
Carbon-fiber interior trip plates	

In addition to the new design packages here is a list of new features for the 2016 Corvettes:

C7.R Edition (see sidebar for details)	Carbon-fiber hood option with visible weave section
Blade accessory wheel	Two-tone GT seats – red or gray in leather or suede
Red or yellow stitching with the 3LZ Jet Black interior	Power cinch latch on the coupe or convertible
Front curb view camera offered on the 2LZ or 3LZ trim option	Enhanced MyLink system
New high-definition video camera for a better quality picture	

A wide variety of 2016 early build Corvettes were on display for inspection parked outside of the conference center. Staff from the Bowling Green Assembly Plant and Corvette Engineering in Detroit were on hand to answer questions about the new Corvettes.

Besides learning about the new Corvettes, the Bash had a full agenda all weekend. Corvette Racing Manager Doug Fehan gave a large crowd of enthusiasts an update on how the 2015 season is progressing for the C7.R program. Driver Tommy Milner answered questions and talked about how the team is using the NCM Motorsports Park for testing the C7.R. The Performance Build Center disassembled and reassembled an LT4 engine each day much to the delight of the large audience that was in attendance. The contractors gave an update on the progress of the sink-hole repair (see sidebar). A large turnout of

Corvette owners were on hand for the Celebrity Car Show. All of the winners gathered their cars on the circular driveway to receive their awards. Guy Larsen from Bloomington Gold and Chris Chessnoe from Callaway Cars held a seminar on how to inspect and buy a vintage Corvette. Speaking of Callaway, Chris brought their first upgraded Z06 that is still undergoing final calibration. The company is targeting 750+ hp at the crank. It is an awesome sounding Z06; can't wait for a test drive. All in all, it was a very busy weekend at the NCM museum and the NCM Motorsports Park. If you ever feel like immersing yourself in Corvettes for a weekend, plan on attending the 2016 Bash. Who knows what Tadge and his merry band of Corvette engineers might unleash on us next year? For more museum news and schedule go to www.corvettemuseum.org.



The Ron Fellows Performance Driving School at Spring Mountain offers new C7 owners the opportunity to safely learn the capabilities of the new Corvette. This is one of the school's Z06 Corvettes that is used in the program along with Z51 Stingrays.



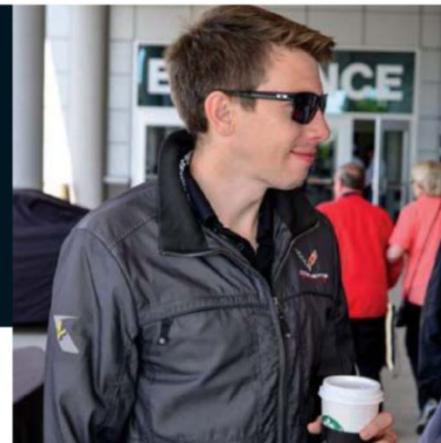
This striking Blade wheel looks like it is moving when it is standing still. It has been added to this Long Beach Metallic Z06 with a Z07 package and makes a striking combination.



Here is a close look at a Twilight Blue Design top fitted to this Shark Gray convertible.



Front curb view parking cameras (one left and one right) on the grille are offered on the 2LZ/3LZ trim packages.



C7.R factory race driver Tommy Milner is very popular with Corvette Racing fans. He and Corvette Racing Program Manager Doug Fehan provided an update on the 2015 racing season.

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LIFESTYLE

NCM BIRTHDAY BASH

2016 C7.R Edition Unveiled

A limited edition 2016 C7.R Corvette was unveiled at the 2015 NCM Birthday Bash by Chief Engineer Tadge Juechter. The Z07 performance package equipped Z06 will be available in Corvette Racing Yellow or Black. It will be built in coupe or convertible with 3LZ trim. Only 500 of these Corvettes will be built (including coupes and convertibles) and each will carry their own VIN number starting at 700001. See the chart to the right for what the C7.R Edition includes.

Corvette Racing parked one of its actual C7.R race cars in front of the new Corvette. The new special edition captures the look of the actual race car. It will be interesting to see how quickly this beautiful new edition sells. The buzz in the crowd over this new car was very positive.

NCM Sinkhole Update

In the early morning hours of February 12, 2014, the unthinkable happened. The floor of the National Corvette Museum Skydome opened and swallowed eight historic Corvettes. Each was recovered, but only three are repairable. They are the ZR1 (repair completed), the 1-millionth convertible (repair in progress), and a Tuxedo Black 1962 Corvette donated by the late David Donoho (repair has not begun). The remains of the other five Corvettes will become museum displays. We did a four-part feature in 2014 detailing the history of all eight of these cars. When the series was completed, the NCM board had not decided on how they should remedy the hole in the floor. Late last year the decision was made to completely fill the hole. When that was completed, a new flat concrete floor was poured over an extensive network of steel rebar. Underneath, it is being supported with numerous deep pilings (some extend 200 feet) to prevent another failure.

When Team Vette attended the 2015 Bash, we were allowed to visit the work site so we could update you on the construction progress. The Scott, Murphy & Daniel Construction crew has completed half of the concrete floor. The remaining floor should be finished by Labor Day. We think the NCM made the right decision to fill and extensively support this giant hole that opened under this key museum display area. To get the latest update on the progress of the construction go to www.corvettemuseum.org.

Callaway Introduces 750+ HP Z06

Can a person ever get enough horsepower? The folks at Callaway don't think so. They upgraded the one-element 650hp factory supercharger to increase power. The posted horsepower results are not yet available as this issue goes to press, because the final engine calibration and dyno results were not completed. Callaway's Program Manager Chris



2016 C7.R EDITION

C7.R graphics package	Yellow brake calipers
Visible carbon-fiber hood section	Black wheels with yellow accent stripe
Corvette Racing-logo center caps	Carbon-fiber ground effects package
Spectra Gray grilles and vents	Jet Black leather interior with suede accents on the doors and instrument panel
Yellow stitching in the interior	Carbon-fiber interior trim package
Corvette racing sill plates	C7.R edition interior plaque
C7.R graphic covered indoor car cover	



Chessnoe told Team Vette at the Bash that he is confident the engine will produce over 750 hp at the crank thanks to an Eaton TVS 2300 supercharger. This will make for a very stout Z06! The price for all of this pleasure is \$16,995 and can be added to any new 2015 or 2016 Z06. The company's signature "Double D" exhaust is

an available option (\$2,890).

The General Motors warranty applies and comes with a supplemental Callaway 3-year/36,000-mile warranty that covers Callaway-installed and certain GM components. A Callaway 5-year/100,000-mile service contract is available. For more details visit www.callawaycars.com. **VETTE**



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BEST-KEPT SECRET IN MOTORSPORTS

SPRING VINTAGE CLASSIC AT SEBRING INTERNATIONAL RACEWAY

BY JOHN PFANSTIEHL

An undiscovered gem for motorsports and car enthusiasts is sandwiched between the February NASCAR Daytona 500 and the March IMSA 12 Hours of Sebring endurance race. Sebring International Raceway hosts the little-publicized Spring Vintage Classic races by the Sportscar Vintage Racing Association (SVRA), paired with the opening of the Trans-Am racing series.

Sebring International Raceway is best known for the famous international endurance race, The 12 Hours of Sebring, which is the U.S. counterpart to the 24 Hours of Le Mans. Expect huge crowds during that well publicized event, but other events offer plenty of legroom. At the spring SVRA event, \$35 buys four days of racing; pit access; a car show; fireworks; plus free, dry camping. Pitch a tent or park an RV or rented minivan right next to the track, or under the shade of nearby oak trees draped with Spanish moss.

The SVRA event is packed with Corvettes of all ages. The pits are open, so you can inspect the race cars up close and talk to the drivers and car owners. Bring comfortable shoes because spectators can walk around the inside or outside of the sprawling 3.7-mile track to find uncrowded spots to watch the action from any angle.

The 2015 SVRA event was part of a double-header. After watching the many heats of vintage sports car racing, the grand finale was modern Trans-Am racing. This year had big news with Amy Ruman driving a Corvette to secure the pole position in the TA class on Friday and beating all challengers again on Sunday in the feature race. This was one of the

most hotly contested Trans-Am races ever, with a record-setting field of 69 cars.

It's rare to find a value like this in motorsports, and Florida's March weather makes this a great destination for the winter-weary. In fact, stay a little longer for the entirely different experience of The 12 Hours of Sebring. Spectators this year witnessed Chevrolet power winning the event overall for the first time in 50 years – when the Chaparral took the checkered flag in 1965. **VETTE**



Bill Treffert's #24 1960 Corvette put on one of the most exciting battles, racing for the lead with a pair of Porsches. The Corvette prevailed, taking first in class.



During the lunch break, spectators can drive their own cars on the fabled Sebring course for a number of laps. Just sign up before and pay a small fee.



Sebring's 3.7-mile road course provides hundreds of spots for close-up viewing of the racing from every angle.



C3s were well represented, many with a racing past. They sound just as ferocious in the present.



The gorgeous 000 Grand Sport replica was one of the many vintage Corvettes to carry its driver to the podium.



Sebring's very long grandstand provides a shaded second floor. It's a great viewpoint for catching pit stop action and the checkered flag.

LIFESTYLE

BEST-KEPT SECRET IN MOTORSPORTS



Amy Ruman drove the #23 Corvette to secure the pole position in the TA class on Friday and she beat all challengers again on Sunday in the feature race.



This was one of most hotly contested Trans-Am races ever, with a record-setting field of 69 cars.



What's better than a racing weekend at Sebring? Bill Treffert thinks it's a weekend racing with your daughter and son. SVRA events are family friendly for spectators, too.



Rain dampened only one race – but it really poured. Some very determined drivers of open cars plowed on despite having no effective wipers and minimal windshields.



There's a lot to see in the pits, from internal details of race cars to vendors, such as Heacock Classic Car Insurance.

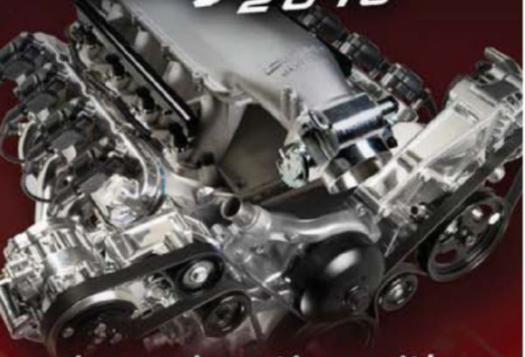


The SVRA event added a car show for 2015 behind the grandstand. As a nice bonus, the cars entered in the show could drive the track at lunchtime for free.



The individual pit setups are as varied as the race cars. Tractor-trailers with huge attached tents occupy the high end of the range.

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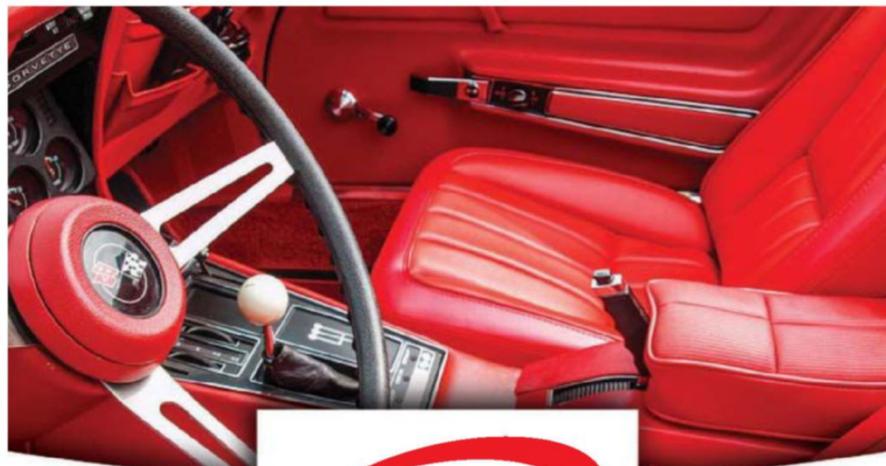


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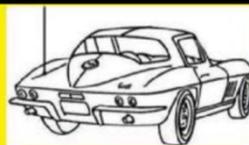


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ALL ABOUT SHOCKS

AN ABSORBING LOOK AT THE BEST CORVETTE SHOCKS FOR THE STREET, DRAGSTRIP, AND ROAD COURSE

BY RICK JENSEN

PHOTOGRAPHY COURTESY OF THE MANUFACTURERS



Corvettes exude confident street handling, and their composed suspensions have morphed mere owners into confident drivers for decades. The lowly shock absorber sits at the center of that superb suspension—quietly keeping your Corvette under control.

The last 50 years of OEM Corvette shocks have been a mix of capable, harsh, and heavily. In-house Delco dampers mixed with aftermarket units in tooth-rattling C2s and C3s, which gave way to taut C4s with mildly adjustable FX3 and Selective Ride systems. C5s bowed with the revised Selective Ride option,

but GM's 2003 introduction of the highly capable Magnetic Selective Ride Control (MSRC) was a game changer. MSRC was further refined for the C6, and now a third-gen MSRC system is available on C7s. The MSRC system allowed Corvettes to be both more comfortable on the street, and more capable on the track. And the fact that Ferrari licenses this technology from GM should tell you something.

But as we all know, not everyone opts for high-end damping, and base shocks on mass-produced cars can't be everything to everyone. Standard dampers are fine for a spirited dance to the local cruise spot, and magnetic

shocks are OK on track days. But for a serious driver looking for optimum performance on the street, dragstrip, or road course, a dedicated set of dampers is key.

OPERATION

Before we start shopping for those sweet, sweet dampers, let's discuss how a shock works. Simply put, shock absorbers damp your vehicle's wheel and body motion, limiting its suspension travel, and maximizing each tire's contact patch. The result is predictable steering response; agile, sure-footed handling; and a comfortable ride, even over rough pavement.

If you've ever bombed down the road in a car with worn shocks, you know how bouncy, uncomfortable, and borderline dangerous the ride is. Thankfully, testing your vehicle for weak shocks is simple, as long as you know what to look for. Take a quick drive on a couple of different roads, and pay attention to your car's movement over bumps, and during acceleration, braking, and swerving. If it exhibits any abnormal harshness, bouncing, nosedive during braking, or squatting during acceleration, your shocks may need to be replaced. You can also look under your vehicle to check for leaking shock fluid, a surefire sign that your damper(s) are on the way out.

CONSTRUCTION

Shocks used to be a simple solution to a complex problem, and were known by their tube designs. But today, triple-tube, twin-tube, and monotube aren't specific enough. Factory electronic systems have included Selective Ride and Magnetic Selective Ride Control, and the aftermarket has birthed user-adjustable shocks. Single-adjustable shocks let you change both the compression and the rebound together. Double-adjustable shocks allow the compression and rebound to be adjusted independently. There are even triple- and quadruple-adjustable dampers for road racing machines!

Thankfully, all of these complex designs share similar base components, so it's easy to wrap your head around. Here's what your shocks are made of:

EXTERNAL COMPONENTS

The **housing** is a cylindrical tube that contains the shock's innards. It is smooth in most OEM applications, and threaded for coilover designs. Some applications also use a **dust cover**, or **boot**, over the housing.

The **suspension mount** is the top shock mount that attaches to the vehicle's body. Attachment options can include a threaded rod with nut, retainer, and insulator; an eyelet with a mounting tab or a large bolt hole; or a strut-type mount with multiple mounting bolts.

The **chassis mount** is the bottom shock mount that attaches to the vehicle's chassis. Attachment options can include a threaded rod and bolt; an eyelet with a mounting tab; or a large bolt hole, or a strut-type mount with multiple mounting bolts.

Adjustable shocks also have some type of external adjustment apparatus that alters the shock's internal operation; they include **knobs**, **buttons**, **slots** for an Allen wrench, and **turning the piston rod**.

High-end racing dampers often use a **remote**, or **piggyback**, **reservoir**. When connected to the shock with a **hose**, it allows you to make easier, more precise adjustments. It also helps keep the hydraulic fluid cooler.

INTERNAL COMPONENTS

The **rod** is, well, a fixed rod that is mounted at the bottom of the shock at one



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BILSTEIN

Bilstein supplied monotube shocks to a Mercedes back in 1957, and has been one of the world's premier damper companies ever since. Bilsteins are consistently rated as some of the world's best high-performance street dampers, they have long been successful in racing, and best of all, they cover a massive number of vehicles—including C1 through C6 Corvettes. C1 46mm Monotube (PN 24-002837 front, 24-004930 rear) and C4 36mm Monotube (PN 24-002288 front, 24-184588 rear) are seen here. Both of which cost around \$98.

end, and wears the piston at the other. In fancy talk, it's known as a damper rod and it wears a housing seal to prevent fluid from seeping out.

The **piston** is where the **compression** and **rebound valves** live. These valves use orifices to restrict oil flow during compression (wheel moving up) and rebound (wheel moving down). Re-valving shocks is a common modification for both street performance and racing; we'll go more in-depth on that in a bit.

Fluid, or more accurately hydraulic fluid, is the liquid inside of shock absorbers. It is separated by the piston and its seal, and it flows through the valves to provide the damping. Quality fluid has the following properties: anti-foam and non-volatile for accurate damping, and anti-wear for long seal life.

Note that **magnetorheological (MR)** fluid is the special fluid found inside of GM's Magnetic Selective Ride Control shocks. This fluid contains iron particles that can be polarized by magnetic fields. So when the signal to each MSRC shock's internal coil changes, the MR fluid's viscosity instantly changes as well.

Depending on the design, shocks contain **nitrogen** or **air** to pressurize the fluid. The gas is located in either the **outer chamber** of a twin-tube shock, in a **plastic bag**, or **mixed in with the oil**. Monotube designs, with their bigger components and greater control, typically use a high-pressure nitrogen gas.

OEM VS. AFTERMARKET

You know how your engine's stock air intake is quiet, but restrictive? Well, aside from the occasional outlier (like those sweet, sweet Z06 dampers), most OEM shocks are also designed with compromises that limit their performance. After all, there are a gazillion all-terrain SUVs out there that have never spun gravel in anger, so it makes sense that many Corvettes wear base shocks because they'll never see hair-on-fire driving.

That's a damn shame, because most Corvettes would benefit from aftermarket dampers—they make a big difference on street ride and handling, too. So here are a few reasons why quality aftermarket shocks are a great upgrade for your Vette.

A Better Ride: in addition to improving 10/10ths handling performance, quality aftermarket shocks also offer a smoother, more comfortable ride over a wider range of surfaces. There's a reason why drop-in Bilsteins and Konis are favorites of the serious street/occasional track day crowd.

Quality Construction: factory and low-quality replacement shocks aren't as precision-built as quality aftermarket shocks are, which can lead to premature wear and leaks. Many aftermarket shocks use high-quality components, are machined to the tightest tolerances, and have a limited lifetime warranty for the original purchaser.



KONI

Koni is a true shock pioneer, offering auto dampers as early as 1932, adjustable telescoping dampers since 1945, and the world's first adjustable shocks. Koni makes shocks for damn-near everything—from race cars to buses, sports cars to trains. But unlike those cheap, wallowing horror-shows from other massive shock makers, Koni's street and race shocks rank with the industry's finest. The C4 Koni Sport costs \$144 (PN 8241-1097Sport front, 8241-1098Sport rear) while the C3 Koni STR.T is just \$65 (PN 8050-1136 front, 8050-1137 rear).



QA1

QA1 offers a wide range of high-performance and racing shocks for Corvettes. Stocker Star series shock absorbers are direct bolt-ons for 1963-'04 Vettes. Its Pro Coil shocks and springs system provides ride control and height adjustability for 1997-'04 C5s. And the "R" series drag shocks have a firm compression with a wide range of rebound, for the ultimate in weight transfer. Every aluminum QA1 shock is 100 percent handbuilt, dyno tested, and serialized at QA1's Minnesota facility, and they're also rebuildable and revalveable by the QA1 factory or QA1 Authorized Service Centers. The double-adjustable C5 coilovers are seen here (PN GD401 front, GD403 rear) and cost \$699. The non-adjustable, twin-tube C3 Stock Star shocks (PN TN508 front, TN403 rear) are also pictured and cost just \$108.



JRi SHOCKS

JRi Shocks was founded in 2007, and is an engineering-led company with over 300 combined years of collective racing and manufacturing experience. The C5/C6 Corvette shocks (PN 100-207, \$3,199) were designed with input from Danny Popp, 2012 and 2014 winner of the Optima Ultimate Street Car Invitational. These nitrogen-charged Corvette shocks provide superior grip, enhanced response, and unmatched damping capabilities for performance street and Pro Touring applications. And JRi's performance technology allows a transition from the street to the track in minutes, optimizing overall handling for the desired application.

Near-Unlimited Compression and Rebound: even the best electronically adjustable OEM shocks only offer a handful of driver settings, usually along the lines of "Tour," "Sport," and "Track." And while there's no doubt that the C7 MSRC system—and its 15-millisecond damping—is a tour de force, the fact is that a quality, double-adjustable damper can call up hundreds of combinations of compression and rebound. And in the constantly changing environment of hard-core street or racing use, that precise adjustability is priceless.

Better Geometry and Height Adjustments: there's a reason why exotics like Lamborghinis utilize Öhlins coilover shocks with their race-ready, pushrod, double-wishbone suspension designs: optimized geometry results in optimized performance. Also, those sweet threaded coilovers offer amazing handling—with a side of precise ride height adjustments for that killer stance.

Customized, High-Performance

Options: regardless of your intended use, paying a few extra bucks for a quality set of **serviceable** dampers is a good idea. If your ride sees tons of street miles over the years, you can send them in to be refreshed to like-new condition, and if you bought smooth-body (non-coilover) units and want to lower your car later, they can be **shortened** to properly work with shorter springs.

If you're going to race your Vette, they can be **revalved** for optimum performance on the track, and **rebuilt** after a season of heavy use.

Ultra-high-performance road-racing shocks from Penske and the like give you even more: **CNC construction, premium-quality components, massive shafts, remote reservoirs**, etc. And then there's the adjustability: **triple-adjustable units offer a single rebound adjustment along with independent, low- and high-speed compression adjustments**. And now there are even **quadruple-adjustable racing shocks that offer independent, low- and high-speed compression and rebound adjustments!** While you'll pay between \$2,500 and \$6,000-plus for a set for these coilover wonders, you'll have the hardware to tame virtually any track in the world.

APPLICATION

Street shocks are replacement dampers that are used for mostly street duty. They're built to keep your Corvette stable on a wide variety of roads, but also offer improved comfort and at-the-limit control over OEM shocks.

Drag shocks are used for drag racing. They can still be found in non-adjustable "90/10" spec, but the vast majority are adjustable. Just like road racers, drag racers benefit from hundreds of compression and



VIKING

Viking was started in 2011 by industry veterans with over 40 years of suspension experience in the performance aftermarket. Chris and Christina King founded the company with the goal of providing high-performance shocks, springs, and rod ends at the best value in the market, with exceptional customer service to boot. Viking offers front and rear smooth body replacement shocks for C1s through C6s, front and rear coilover kits for the C5 and C6, and front coilovers for the C2 and C3. Its mission is to make quality double-adjustable shocks attainable to everyone; by focusing on fully serviceable double-adjustables, Viking is able to keep prices competitive with competitors' single-adjustable shocks, thereby providing the customer with a better shock for the same money. The C3 Viking Warrior (PN VSK219) costs a reasonable \$704.



PENSKE RACING SHOCKS

Born in 1988 to supply shocks to Indy Car, Penske Racing Shocks grew quickly, and soon supplied most racing series, including Formula 1 and NASCAR. PRS has a loyal following in the Corvette racing scene, and it handbuilds its billet-machined dampers to each customer's requirements. Non, single-, double-, and triple-adjustable dampers are available to Corvette owners. Seen here are the latest and greatest C7 coilovers for \$4,900.



MTI RACING

Founded in 1993, MTI Racing is led by former World Challenge racer Reese Cox. Cox has won, raced, or been involved in racing series like SCCA, Corvette Challenge, 24 Hours of Daytona, and IMSA for decades. MTI Racing leverages that incredible experience by supplying top-quality racing products and support, and is staffed with a crew of engineering, fabrication, professional racing, and troubleshooting experts. Their C7 Z06 test car recently picked up a full 3 seconds at Atlanta Motorsports Park after removing the factory leaf spring and installing their coilovers! These triple-adjustable coilovers with Penske dampers (PN MTI-002-002) retail for \$3,995. The Bilstein-based C5/C6 coilovers (PN MTI-102-002) are also triple-adjustable, but a bit cheaper at \$2,595.



NITRON USA

UK-based Nitron boasts over a decade of success, and benefits from a design team with an accumulated experience covering machining, materials technology, hydraulics, bike engineering, and F1 racing. The result is prestigious race wins and lap records around the world. Nitron shocks are designed, developed, and manufactured in the UK, and are handbuilt, billet-machined, fully serviceable, and customized to your spring and damping requirements. C5 and C6 triple-adjustable coilovers are the only applications currently available, which range from \$2,095 to \$4,800 depending on the model: R1 Performance, R1 Street/Track, or R3 Race.

rebound adjustments to get their car dialed in from track to track.

Road race shocks are used for road racing. Because of the extreme demands (and extreme dangers) of road racing, high-quality adjustable shocks are a wise modification. And depending on the driver's class and goals, a pricey one, companies like Penske and Moton offer triple- and even quadruple-adjustable Corvette shocks that allow independent, high- and low-speed compression and rebound adjustments. **VETTE**

For a full guide to all available shocks for your Corvette, go online to: <http://bit.ly/1FSmgR7>

WILD HORSES

UNLEASHING 720 HP FROM EDELBROOK'S STROKED AND SUPERCHARGED LS3

BY STEVE TEMPLE

PHOTOGRAPHY BY THE AUTHOR AND COURTESY OF EDELBROOK

Higher pressure and more volume. Those two basic elements are what's required to pull 720 hp and 695 lb-ft from Edelbrock's hard-charging LS3 crate engine. The higher pressure results from the forced induction of an E-Force TVS blower. And more volume comes from a stroked crank and rods.

All easier said than done, of course. So we spent some time sweating the details with the engine guys at Edelbrock to find out what it takes to whip an LS3 into a lather. After all, getting a thoroughbred to run harder and faster requires way more than just ringing a bell.

Consider the performance parts that Shaver Racing Engines installed into the LS3 block. Increasing the swept volume of the cylinder from 376 to 416 cubes begins with a Manley crankshaft boasting a 4.00-inch stroke (increased from 3.62 inches stock). It in turn pumps elongated H-beam connecting rods and aluminum pistons through a 4.065-inch bore.

While this stroked setup is a well-proven path, some background info shows just how far we've come in the last 16 years or so. Recall that the old 5.7L LS1 was inherently constrained by its 3.90-inch bores, so that even when honed almost to the water jacket, a 4.00-inch-stroke crank achieved only 383 inches. A larger bore required sleeving the cylinders—an expensive and not always reliable option, since coolant leaks and poor cylinder sealing often resulted.

In 2005, the LS2 featured siamesed cylinder bores, making a 400ci displacement possible with a stroker crank. Then just two years later, the 6.2L block was released (basically the same one found in the LS3), featuring a 4.065-inch bore. Now, hone out the bores by 0.005 inches and fit in a 4.00-inch crank, and voila—the displacement goes from 376 to 416 cubic inches.

What sort of crank does Edelbrock use? Manley's lightweight design consists of 4340 forgings, nitrided for added strength, along with other treatments such as stress relieving, shot-peening, and magnafluxing. The large, 0.125 radius journals are micropolished and lightened as well. For sufficient clearance from the piston skirts, the counterweights are fully profiled, and the main journals are gun-drilled for further weight reduction.

The aforementioned Manley H-beam rods measure 6.125 inches (versus 6.098 inches stock), with the block cleared to prevent interference with the rod bolts. As for the forged 2618-aluminum pistons, they have an 18cc dish, for a comparatively lower 9.5:1 compression to offset the increased airflow from the blower and ensure a smooth, knock-free burn of 91-octane pump gas. (In a naturally aspirated LS3 stroker, a CR of 11.7:1 is not uncommon, delivering an output of 600 horses or more.)

The pistons feature low-friction, 0.150-inch floating pins instead of



O1 Rather than a press-fit pin, the Manley pistons have low-friction, floating pins with an offset design to reduce piston slap.

pressed-fit units. In addition, Manley employs a one-fixture manufacturing process to maintain an optimum ring-groove-to-skirt squareness. An offset wristpin design reduces piston slap, and a bridging ring spans the pin area. Total Seal's package has 1.5, 1.5, and 3mm rings. Roundwire locks, tool steel wristpins, and pressure balance grooves are included with every set.

As already noted in passing, a naturally aspirated stroker engine leaves some ponies on the table, which leads us right into supercharging—the source of the higher pressure mentioned at the outset. Edelbrock's E-Force LS3 blower spins Eaton TVS 2300cc/rev four-lobe rotors with 160 degrees of twist. They're designed for maximum flow, minimum temperature rise, and quiet operation for better driveability. An integrated bypass valve helps eliminate parasitic loss under light throttle for improved mileage potential (as if fuel efficiency is even a consideration when running a blown stroker).

E-Force superchargers have an innovative inlet configuration with a shorter, less restrictive intake path for improved airflow, and no need for a jackshaft. Keeping the air cool is a high-capacity, air-to-water intercooler and low temp heat exchanger.

The supercharger features a driver-side throttle body orientation for ease of intake routing in a variety of project vehicles, and a Corvette belt offset for a compact installation. The top of the supercharger measures 21.54 inches from crank centerline in its standard configuration. A special order is available for a lower profile, Corvette C6 lid for an additional 2 inches of hood clearance, and Edelbrock is receptive to other custom requests.

With the supplied 2.75-inch supercharger pulley, boost is approximately 12 psi. Even more pressure is possible, up to about 14 psi, by adding an optional overdrive crank pulley. To keep pace with increased airflow of the blower, Edelbrock supplies 60 lb/hr injectors and custom fuel mapping with its pre-programmed ECU. But for the higher psi figure noted above, a custom tune and bigger fuel pump would be required.

Typically, positive-displacement, supercharged cam profiles have wide lobe



02 Here's a close-up of the bridge ring in the wristpin area.



03 Close-up of Manley's H-beam rod and dished piston with valve clearance.



04 The camshaft is specifically configured for a supercharged application with a 121-degree lobe-separation angle.



05 Manley's 4.00-inch crank not only has a longer throw, but also profiled counterweights for clearance.



06 Edelbrock uses stock GM LSA cylinder heads and rocker arms with its own Beehive springs (PN 5768) to accommodate the camshaft. LSA heads are identical to LS3 except that they are "rotocast" from A356T6 alloy to eliminate porosity. This makes for a stronger cylinder head with better heat dissipation, designed specifically for a supercharged application.



07 The standard supercharger assembly and matching aluminum coil covers are black powdercoated for durability.



08 A low-profile Corvette lid (shown here) is available for the blower case, to provide an extra 2 inches of clearance. Normally, the top of the supercharger measures 21.54 inches from crank centerline.

separations and minimal (or negative) overlap, hence the 121 LSA of the bumpstick. The hydraulic roller camshaft offers up to 215 degrees intake/247 degrees exhaust duration at 0.050 inch and 0.629/0.656-inch lift using the included 1.7:1 ratio roller rocker arms. The heads are high-flow LSA units designed for supercharged applications with a swirl feature on the intake ports that allows for more spark advance.

The Edelbrock GM LS 416-cid E-Force supercharged long-block crate engine comes complete with essential supercharger kit components, such as the electric intercooler water pump, intercooler plumbing and recovery tank, as well as fuel rails, 60 lb/hr fuel injectors, a mass airflow sensor housing, and a reusable air filter. A turnkey package with all the front-drive accessories is also available to suit the particular needs of vehicle builders.

Either way, this racehorse is ready to run in a Corvette or other projects. Just spank the flanks and you're off! **VETTE**



09 This closeup of the low-profile blower case shows the driver-side throttle body orientation for ease of intake routing.



10 The standard pulley size delivers 12 psi of boost.



11 The Bosch MAP sensor comes mounted on the blower case.

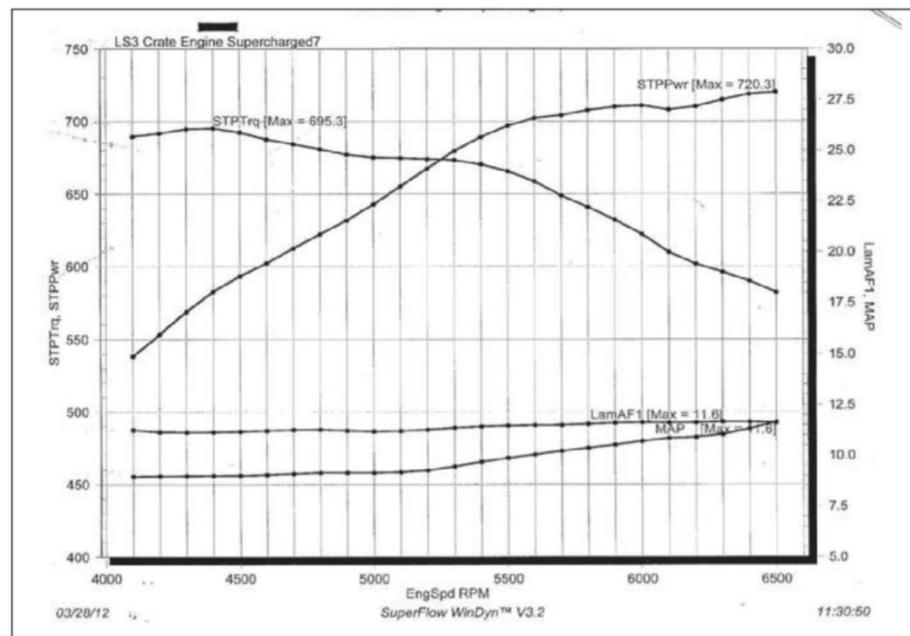


SPECS

Displacement:	416 cid
Horsepower:	720 hp
Torque:	695 lb-ft
Compression:	9.5:1
Block:	GM LS3 aluminum
Crankshaft:	Forged 4340
Pistons:	Forged aluminum - 18cc
Rods:	Forged H-beam
Camshaft:	215°/247°, 0.629/0.656, 121 LSA
Rocker Arms:	LS3, 1.7 ratio
Induction:	E-Force Supercharger System (PN 1540)
Cylinder Heads:	GM LSA with Edelbrock valvesprings (PN 5768)
Finish:	Black powdercoat
Warranty:	2-year / Unlimited mileage

Source

EDELBROCK, LLC
310/781-2222
www.edelbrock.com



12 At a fairly high 6,500 rpm, Edelbrock's 416ci stroked and supercharged LS3 hits its peak horsepower of 720 hp. Peak torque of 695 lb-ft is at 4,500 rpm and is nearly instantaneous. If the dyno read lower, we'd bet this flat line extended all the way to 3,000 rpm or below. That's the kind of power you can really feel leaving a stoplight.

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LEVEL 3 UNLOCKED

REDLINE MOTORSPORTS TAKES A C7 Z06 TO THE NEXT LEVEL WITH THREE COMMON BOLT-ONS

BY SCOTT PARKER

PHOTOGRAPHY BY REDLINE MOTORSPORTS

In our last installment, Redline Motorsports coaxed 31 rwhp from a 2015 Corvette Z06 on its in-house chassis dyno with just tuning. And, as promised, we planned to show what three common bolt-on upgrades could do. With a factory supercharged car, such as the C7 Z06, the two most obvious upgrades are an air intake and a pulley to up the boost. Positive displacement blowers, like the LT4's 1.7L Eaton R1740, suck air through the throttle body, so any improvements in flow on the intake side tend to pay substantial dividends. These benefits are amplified with increased boost levels. And of course, what goes in must come out. The LT4's stainless steel exhaust manifolds flow well enough to produce 650 horsepower, but to eke every last ounce out of it we'll need better scavenging from a set of quality headers.

Redline chose American Racing Headers for a set of 1-7/8-inch long-tube headers. Made from 304 stainless steel, ARH's mandrel-bent tubes merge with a high velocity 3-inch collector. Each bank merges with an X-style "balance pipe" and mates to the factory mufflers after passing through a set of high-flow catalytic converters. Often, bolting on a set of headers alone will decrease boost, as back-pressure is minimized. While making the same (or just slightly more) power with less boost is indicative of a performance improvement, it does not get us any closer to blowing the doors off the neighborhood supercar. Hence, this is the time to increase boost with a smaller supercharger pulley or an overdrive crank pulley.

Using a smaller blower pulley was deemed too invasive, necessitating removal of the entire supercharger assembly; disassembling it; and pressing on a new, engineered piece. Since the LT4's supercharger utilizes a dedicated drive, Redline chose, instead, to bolt on an overdrive crank pulley as the means of increasing boost. This was much simpler, and just as effective. With 12 percent overdrive, the 1.7L Eaton goes from 9.5 to 12.5 psi. Since

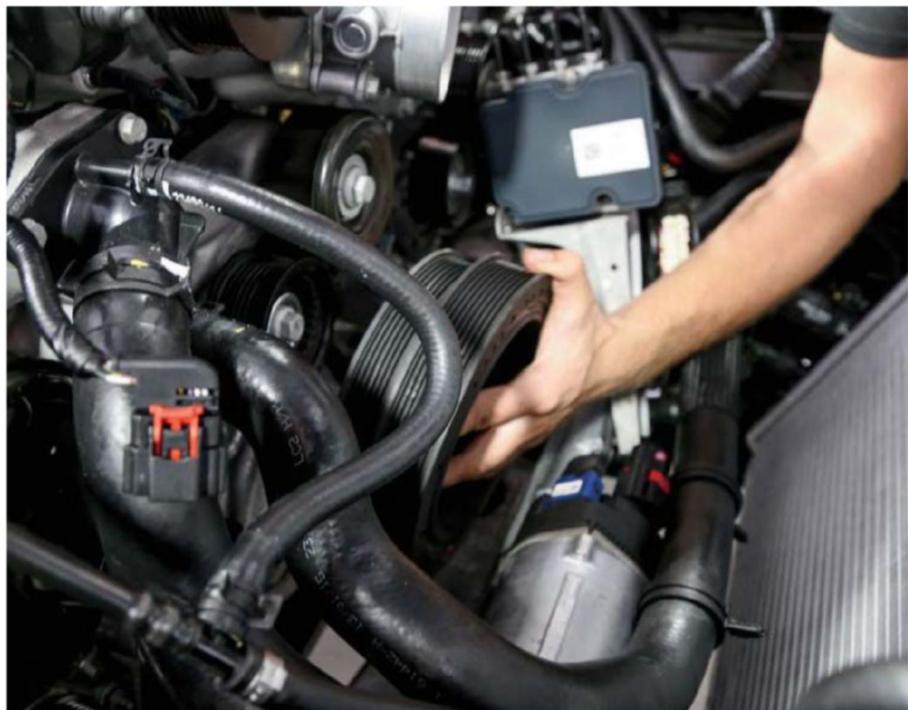


01 Redline Motorsports kicks off the install by removing the restrictive factory air intake on the 2015 Corvette Z06.

the factory balancer is one-piece, Redline's kit uses an ATI harmonic balancer. The ATI Super Damper eliminates torsional crankshaft vibrations, which can be particularly troublesome in a supercharged application since it puts additional strain on the crank.

The Halttech Stinger-RZ intake was one of the first cold-air intakes to go on the market specifically for the 2015 Corvette Z06. The roto-molded plastic intake can actually increase boost on its own by eliminating restriction (typically 0.7 to 1 psi), particularly with the filter itself. Founder Jim Hall (of Halttech) says the factory filter designed for the 460hp Stingray was carried over to the 650hp Z06. Two versions of this intake are available, with a synthetic filter (no tuning required) or a high-flow filter (tuning required). Redline went with the latter.

After all of the wrenches were turned, once again Howard Tanner strapped the 2015 Corvette Z06 to Redline's DYNOmite chassis dyno and tweaked the tune using HP Tuners software. From its previous best of 612 rwhp, the C7 Z06 upped the ante to 659 rwhp. Although this concludes this build, the crew from Pompano Beach, Florida, has a few more ideas of how to turn up the wick on the C7 Z06. Stay tuned! **VETTE**



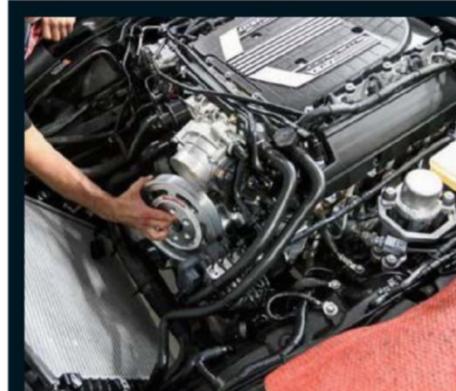
02 The factory balancer is pulled using a pulley removal tool.



03 The factory balancer has a dedicated drive (front piece) for the supercharger. The diameter of this pulley dictates how many revolutions the supercharger will turn per crank revolution.

04 Redline offers these pulley kits for several supercharged GM applications, with varying amounts of overdrive. This is a three-piece design manufactured by ATI Performance, with its SFI-approved Super Damper providing the harmonic damping.

05 The pulley installation tool is used to properly press the balancer onto the snout of the crank.



06 The overdrive pulley, though, simply bolts on.



07 Moving up top, you can see how less severe the bend in Halltech's intake is compared to the factory intake. This helps increase flow and enhance the LT4's breathing. A smoother laminar flow into the MAF allows for better readings, gradually necking down from the 105mm read area to the throttle body. Halltech now offers a carbon-fiber/Nomex version (aka CKNZ) that is more heat resistant for even better performance.



08 The Halltech intake uses a larger airbox to house a larger cone air filter that flows 689 cfm, made to Halltech's specs by K&N, and will support 1,000 hp. In preliminary testing this intake was said to make over 30 hp compared to stock, and this was an early mold. The retail version should look identical to this, but with slightly better flow.

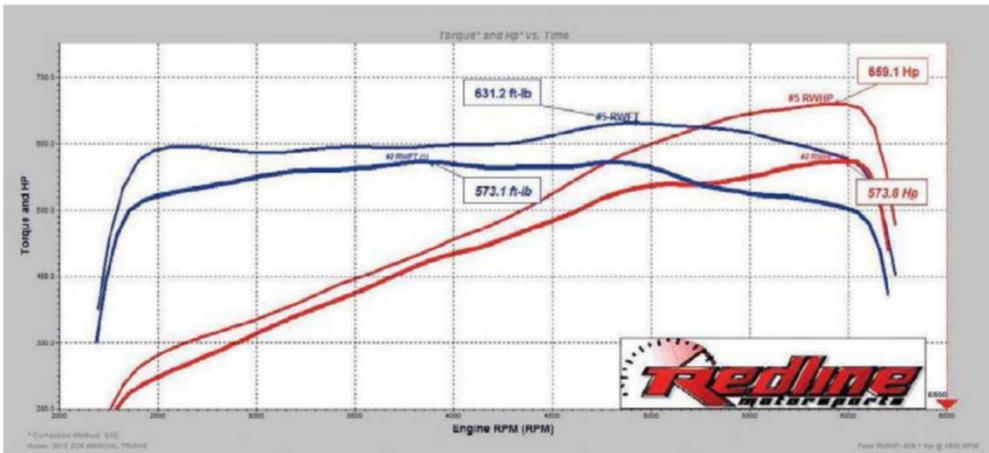
09 Moving underneath, the factory 2015 Corvette Z06 has a fairly free-flowing exhaust system, but long-tubes should be a significant improvement.



10 The American Racing 1-7/8-inch long-tube headers utilize a 3-inch ball-and-socket collector, high-flow cats, and 3-inch intermediate pipes that bolt right up to the factory exhaust.



11 Like its predecessor, the C7 Z06 headers slip in from the bottom.



Source
REDLINE MOTORSPORTS
954/703-5560
www.redline-motorsports.net

12 With the exhaust bolted back together, Redline threw the C7 Z06 back on the chassis dyno for some tuning. After a few more tweaks, the trio of bolt-ons and custom tuning gained 85 hp and 58 lb-ft of torque (from stock) with no sacrifices in the rpm range. That's roughly 738 hp at the crank. Not bad for a day's work.

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JERRY HEASLEY WORDS | PHOTOS



ONE-MILE 1990 ZR-1

 Rick Zimmerman, an orthodontist in Peru, Indiana, has driven his 1990 Corvette ZR-1 exactly one mile since new. People are amazed. Many are wondering why. "There was so much fanfare with the introduction of that car, being a separate model from the base Corvette and the ZR-1 Performance Package being over a \$27,000 option. I just thought it would be a nice collector's item if kept in perfect condition."

Zimmerman remembers he "bought all the car magazines" praising the "King Of The Hill." He also bought model cars of the ZR-1 and saved them. Zimmerman trailered his brand-new, red ZR-1 home from Bill Estes Chevrolet in Indianapolis in April 1990.

"This has been the only car I've ever collected and saved. I've had other Vettes. I bought a '73 brand-new that I really loved. I sold that one when I got married and went into the Air Force and went overseas."

Rick wishes he had stored the '73, a car he owned for less than a year. He bought other

Vettes later – a silver anniversary '78, an '84, an '85, and an '86. Apparently, preserving the ZR-1 fulfilled some kind of desire Zimmerman had harbored for years. I'm sure many other collectors feel the same. They can love a car so much they want to preserve their treasure.

The ZR-1 of 1990 was certainly a hot item brand-new. Zimmerman remembers prices going for \$20,000 over sticker. His dealer on the northwest side of Indianapolis, Bill Estes Chevrolet, sold this ZR-1 for sticker, which was

over 60-grand. His car was red and loaded – "both tops and all the options you could get at the time."

Rick had been noticing that many of the ZR-1s came from the factory with 50 miles or more. He wanted his new ZR-1 with as few miles as possible. "The factory tested the early ones quite a bit before they shipped them out. And a lot of the ZR-1s were test driven by everybody who worked at the dealerships."

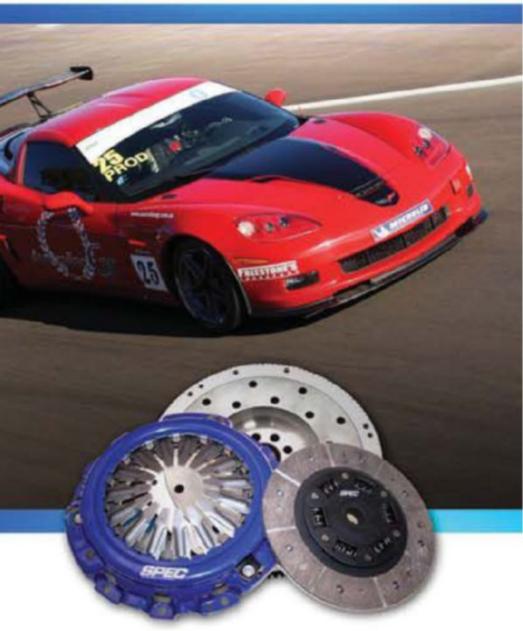
Zimmerman had a meeting with Bill Estes,



One Rick meets another Rick – Zimmerman (right) meets four-time Indy 500 winner Rick Mears in May 1990 – race month in Indianapolis. Just before the race, Bill Estes Chevrolet, held an invitation only VIP event, which included recent car purchasers. Special attendees were Roger Penske and his drivers Elio Fittipaldi, Danny Sullivan, and Rick Mears. Rick Mears and Rick Zimmerman talked about their new ZR-1s since Mears was presented the first one off the assembly line.

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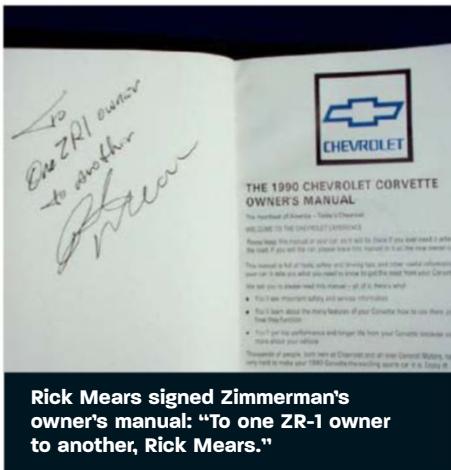
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the owner of the dealership. He asked Estes to not let anybody at the dealership drive the ZR-1, informing him of his plans to preserve it. Estes complied. The odometer read 14 miles on delivery. Zimmerman trailered his treasure home so as not to log any more miles.

"When we moved from our old neighborhood to where we are now, my son and I drove it over early one morning when there was no traffic." This short drive accounts for the one mile. At his new home, Zimmerman parked the 14-mile-turned-15-mile ZR-1 in its brand-new, designated, one-car garage, separate from the other garages, which he designed and built especially for his ultimate Vette.

"I didn't want bicycles falling on it or anything," Zimmerman said. Family garages can be very detrimental to a car's health and well-being. "I also plumbed in the air conditioning from the house into that one-car garage. So it's been climate controlled this whole time. Plus, it's been in the dark. There are no windows in there, so there is no UV light to do damage to the paint." There was no need to drape a cover over the ZR-1. The garage was so clean Zimmerman says to this day, "The car doesn't even get dust on it, hardly."

So, what enjoyment has Rick gotten out of his ZR-1? He says "showing it to people and talking 'Vettes'. We go in and look at it. We lift the hood and look at that great LT5 engine and jaws drop. And, that is fun."

"The month after I bought the car, I met and talked with legendary race car driver, Rick Mears, about our ZR-1s. He had been presented the first ZR-1 off the assembly line, a yellow one. Mears graciously signed my Owner's Manual."

Zimmerman knows the time will come when they will have to "downsize," selling their large house, setting up the problem of storing the ZR-1. "I will have to let it go some day. This car will be around long after we are gone, but it's nice knowing my name was on it for its first 25 years or more."

Is there a lower mileage, better kept 1990 ZR-1 in the world? Probably not. Zimmerman says the tires still have their original air. **VETTE**



Connected to his new house, Rick designed a single-car garage with heating and air conditioning expressly for the ZR-1.



The LT5 still looks brand-new – incredible. Good job of preservation; collectors are wealthier as a result. The year 1990 called and they love your car.





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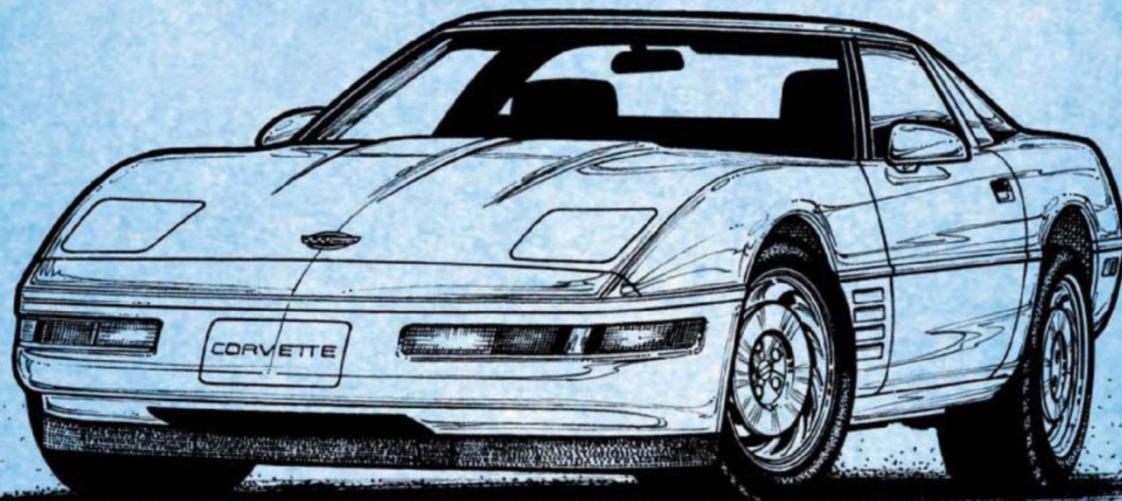
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MID-CYCLE C4 MAKEOVER

The mid-cycle makeover of the C4 was rolled out so quietly and with such stealth, it was hardly noticed. Things were tough inside GM in the early '90s, so the major upgrades were on the installment plan. What is undeniable though is that the 1992 Corvette is very different from the 1989 Corvette. Here's how things unfolded.

Beginning in the late '70s and into the early '80s, car styling became very linier. Curves and rounded corners were replaced with straight lines and hard angles. The trend was in full swing when the C4 was being designed. While the basic "shark" proportions are still part of the C4, the voluptuous curves and hips were straightened out. The C4's interior was consistent with the exterior – mostly straight lines.

"Digital" was the hot new trend, so the C3's round gauges with swinging pointers were replaced with digital numerical readouts, inspired by the F-14 Tomcat fighter jet. All information was numerical with colored bar graph displays. Fuel consumption and remaining range was displayed in either English or

metric. In the day it was very cool, but like most "trendy" things, it got old fast and by the late '80s it was time for a major update.

Not since the '57 to '58 transition had the Corvette's interior been so radically changed. Chevrolet called the new '90 dash a "hybrid instrument panel" that had a digital speedometer with analog tachometer and secondary gauges. The design was no longer straight across and spread out, but curved up from the right side of the new console and across the front of the driver. Everything on the left side of the dash was strictly for the driver. Chevrolet also called it "jet fighter-like." The impetus for the new dash was the now-required airbag system for the driver and passenger, thus necessitating an all-new steering wheel and space on the passenger side for the airbag. So not only was the '90 Corvette safer for the driver and passenger in the event of an unfortunate event, the new interior digs were a nice refresh. Since 1990, I have never heard anyone wax nostalgic for the old days of the early C4 digital dash design. Aside from the new cabin, the '90 Corvette is practically

identical to the '89 Corvette.

For Corvette spotters, identifying '84 to '90 Corvettes is a matter of different wheels, minor details, and the 1990 model's revised dash, making '91 a breakthrough year, but with one slightly confusing detail. The front and rear bumper covers were redesigned to move the overall look away from totally angular, to softer and rounder. You can view this as the trend that lead to the C5. The nose had a curved transition from the front to the sides and the driving lights/sidemakers wrapped around from the front to the side. The side-marker lights were no longer separate units standing alone in front of the wheelwells, as they'd been since 1968. The lower edge transition from the front leading edge of the bumper cover that leads down to the front air dam and spoiler was now slightly curved. The front fender gills were changed from the two vertical slits to four horizontal strakes. The new side vents would carry through to '94 and the front and rear bumper covers to '96.

Another nice change was the addition of body-colored side moldings. Gone was the

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black line splitting the upper and lower halves of the Corvette. Compounding the identification challenge was the restyled wheels. The new design used the previous center button hub, but with eight connecting fan-like vanes that actually pulled air through to help cool the brakes. This wheel design lasted through to the end of the C4 line in '96. Between the bumper covers, fender vents and wheels, it's nearly impossible to tell the difference between a '91 to '94 Corvette.

About the new rear bumper cover. This was a bit of a sore point for C4 ZR-1 owners because the "square taillights with rounded corners" look was the same as the hyper-expensive ZR-1. Everything from the door back on a ZR-1 was unique, but now the base Corvette looked very much like the ZR-1, minus the "ZR-1" badge on the right side of the rear bumper cover. In retrospect, the ZR-1 should have had a more distinctive look that wasn't shared with the base model. Perhaps the "four vertical vent look" from the GTO body kit and something special on the hood, a la the C6 Z06/ZR1 would have set the exotic ZR-1 apart from the regular '91 to '96 Corvettes.

With the interior and exterior all spruced up for the roaring '90s, all that was left to add was more grunt, and OH-WOW, did the Chevrolet engineers deliver. From 1984 to 1992, except for the jump from the '84 205hp Cross-Fire Injection to the '85 230hp Tuned Port Injection engines, horsepower increases were just 5 hp per year, topping out at 250 hp in

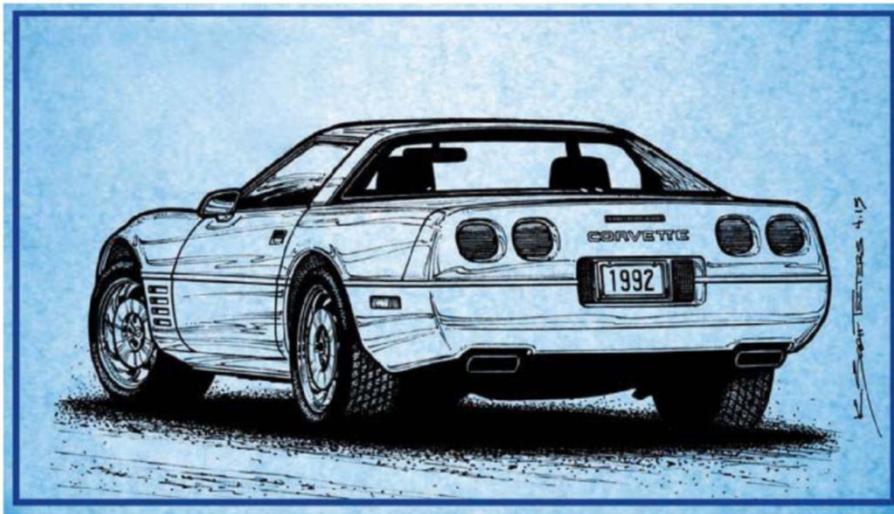
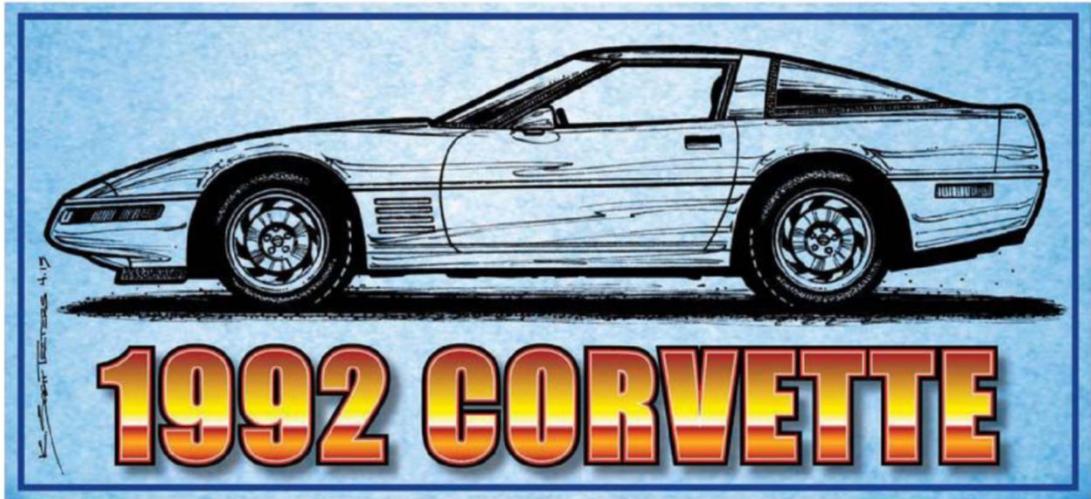
1990. Chevrolet stunned the Corvette world by not only the resurrection of a classic "LT1" moniker, but with a whopping 50hp bump to 300 hp. The baddest C3 LT-1 was the 70-1/2 version that was rated at 370 (gross) horsepower. The new C4 LT1's (net) 300 hp was at least equal to or slightly more powerful than the performance-golden-days classic. Quarter-mile times vary, but the C4 LT1 Corvettes are easily capable of mid-13s at 105 mph in stock form, indicating that the new engine is producing slightly more power than the old classic, with a lot of potential left in what was to be the last version of the classic small-block Chevy engine.

So how did Chevrolet engineers accomplish such a feat? Hot rod tricks! Yes, the basics. The new LT1 had the following goodies that any hot rodder would have done in the olden days. The exhaust system was less restrictive thanks to two catalytic converters and two oxygen sensors (one for each bank).

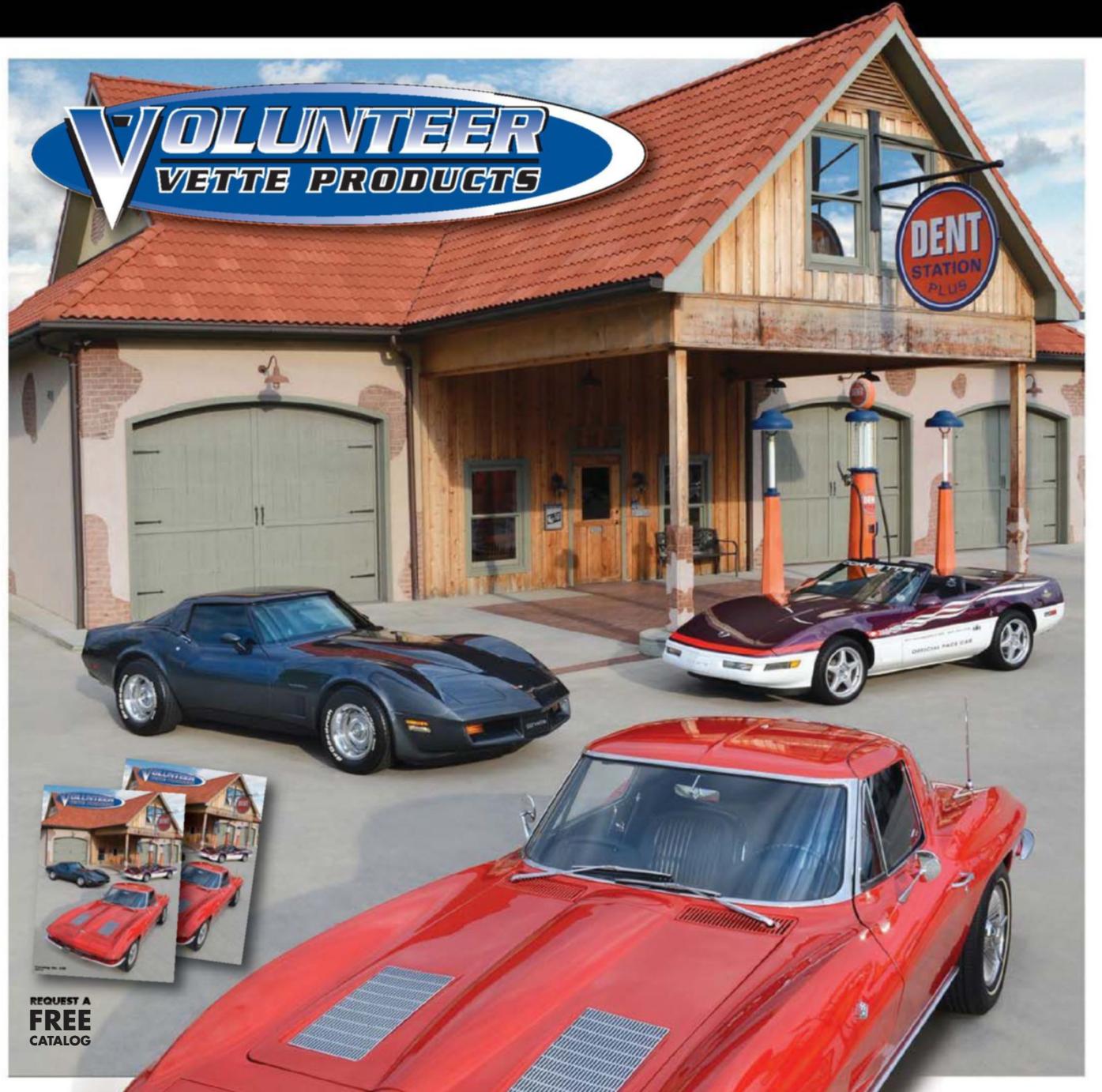
Compression was bumped up to 10.5:1. The camshaft had a revised profile and the heads were the new free-flow design. The new multi-port fuel-injection system wasn't as sexy-looking with the curved intake tubes used on the L98 setup, but it was more efficient and had a lower profile by 3-1/2 inches. The cast-iron cylinder block was new with more beef and set up for the new gear-driven water pump, reverse-flow cooling, and front-mounted ignition system. The new Opti-Spark ignition system helped with the higher compression and emissions, but later proved to be problematic. Overall, the new LT1 weighed 21 pounds more than the L98, thanks to the use of cast-iron exhaust manifolds that replaced the L98's tube steel headers. While we all like to see less weight on a Corvette, the slightly heavier LT1 was worth every pound.

Let's talk price. In 1989, the base model Corvette coupe listed for \$31,545 and the convertible at \$36,785. By 1992, the price had only gone up \$2,090 to \$33,635 for the coupe and up \$3,360 to \$40,145 for the convertible. So for coupe buyers, an extra two grand got you a new interior, updated exterior, and 50 more horsepower. Looks like a bargain to me.

The base model Corvette coasted out the rest of its days to '96 as is, except for new fender vents in '95, the optional 330hp LT4 engine in '96 and various other minor improvements. The flagship ZR-1 exited after 1995, and for the C4's final year Chevrolet dished up the Collector Edition and the 330hp LT4-powered Grand Sport. The Grand Sport's LT4 engine was available on all '96 Corvettes. The C4 Corvette lasted longer than Dave McLellan ever anticipated when it was being designed in the early '80s. The three-part mid-cycle refresh was his final contribution to the Corvette before his retirement in 1992. Thanks Dave! Thanks Corvette team! Good job! **VETTE**



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